

932040674
236040769
695999906

7843692865
3456738625
4386954240

8736000432
1226000433
7499999999

900000000000
100000000000
799999999999

7328694325843
6378954387659

6734870685
1349670627

949732238184

5385280858

86984882
68764895
34838789
57692875
48284569
87629587
12845678
23456789

57895632
48769407
32657489
67825418
78902624
53284768
73628964
27965487

9638745
2387698
0736787
9287396
8486789
5287695
2743869
8729304

449597514

470989789

48268333

876328
862495
638724
567483
295834
822253
3619817

318.41
286.4
3.68.6

KEY

TO

ELEMENTARY ARITHMETIC,

FOR

CANADIAN SCHOOLS,

BY

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AND

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TORONTO:

COPP, CLARK & CO., KING STREET EAST.

1871.

68368743
 47839652
 23466789
 87654321
 91234567
 65432198
 78912345
43219876
 506118491

123456789
 876543210
 901234567
 654321098
 789012345
 432109876
 567890123
210987654
 345678901
4901234563

ELEM

(6)
 8
 7
 6 + 1 = 7
 7 + 2 = 9
 —
 29 b

Entered according to Act of the Parliament of Canada, in
 the year One Thousand Eight Hundred and Seventy-one,
 by COPP, CLARK & Co., Toronto, in the Office of the
 Minister of Agriculture.

987652132	Dead	25-
45678901	Wasting	27
32109876	Draw	11
89012345	Spilling	28
76543210	Cramps	40
23456789	Heat	45-
10987654	Geeg	34 216
67890123	Phys	40
54321098	Liter	50
<u>498765428</u>	Coran	140
	Arith	150
		<u>556</u>

17 + 19 =
 36 + 9 =

KEY TO ELEMENTARY ARITHMETIC.

Ex. VI. (p. 17.)

(6)	(7)	(8)
6	2	A's 2
7	2 + 2 = 4	B's 5
6 + 1 = 7	4 + 2 = 6	C's 7
7 + 2 = 9		D's 9
<u> </u>	<u> </u>	<u> </u>
29 boys.	12 years.	23
	If C had bought	7 more.
		<u> </u>
		30 total.

Ex. VII. (p. 19.)

(36)	(37)
19	32 men.
17 + 19 = 36	65 + 32 = 97 women.
36 + 9 = 45	32 + 97 = 129 youths.
<u> </u>	29 infants.
100 marbles.	<u> </u>
	287

(38)
659 1st
657 + 231 = 888 2d
892 3d
2437 + 11 = 2448 4th
4885 5th
<u> </u>
9770 total.

	(39)		(40)
\$9080	wife's share.		589 1st
\$11788	two younger sons' share.	$215 + 589 =$	804 2d
\$10600	eldest son's share.	$197 + 589 =$	786 3d
\$10600	three daughters' share.	$589 + 786 =$	1375 4th
<u>\$42068</u>			<u>3554</u>

Ex. VIII. (p. 21.)

(21)	(22)	(23)
24916	15499	44821
51954	6824	90323
27499	29620	19096
37750	20325	14669
44720	<u>72268</u>	13743
<u>186839</u>		11555
		<u>194207</u>

Ex. IX. (p. 22.)

(14)	(15)	(16)
44 sheep.	523 bu. wheat.	\$1650
35 cattle.	120 " oats.	160
15 pigs.	64 " peas.	575
6 horses.	237 " potatoes.	200
<u>100 animals.</u>	38 " turnips.	600
	<u>982 total.</u>	<u>\$3185</u>

(17)
 25211
 32050
 31183
 28590
 23780
 24088
165802

Ex. X. (p. 25.)

(30)		(31)
\$560	\$300	75
300	260	47
\$260 w th of carriage.	\$ 40	28
		28
		47 No. of boys. 19

(32)	(33)
49 + 65 + 19 = 133	6 + 4 = 10
167 - 133 = 34	6 - 4 = 2
35 - 34 = 31	10 - 2 = 8

(34)

$$10 + 3 + 8 + 5 + 3 + 4 = 33.$$

$$40 - 33 = 7.$$

Ex. XI. (p. 26.)

(22)		(23)
9277 - 1283 = 7994	2d In.	23047
9277 + 7994 = 17271		175
23257 - 17271 = 5986		10000
		8406
		23222
		368
		1594
(24)		704
1869		
1819		22854
		495
		890
		7305
50 the age of the queen <i>now</i> .		23349
1841		132
50		
		23217

1891 when the prince's age = the queen's. $\therefore$ the difference is $23217 - 8165 = 15052$.

1891 - 1819 = 72 years, the queen's age *then*.

(25)

$$97 - 29 = 68 \text{ Henry's marbles.}$$

$$97 + 68 - 25 = 140 \text{ Charles' marbles.}$$

KEY.

(26)

84

135

39

58

39 + 58 = 97

804

\$1217

\$1217 - \$1000 = \$217 in debt.

(27)

45 - 16 = 29

29 + 7 = 36

36 - 10 = 26

26 + 2 = 28

28 + 4 = 32

32 - 11 = 21

21 + 9 = 30

30 - 7 = 23

23 - 5 = 18

18 + 8 = 26th from top.

45 - 26 = 19th from bottom.

(28)

63 - 5 = 58 children.

105 - 58 = 47 able-bodied.

70 - 47 = 23 infirm.

5 officers.

(29)

1769 - 1696 = 73 eggs.

1262 - 73 = 1189 nuts.

73 + 1189 = 1262

1769 - 1262 = 507 oranges

1189 - 507 = 682

(30)

117986

72268

45718

(31)

45008008

37906703

7096305

(32)

Since minuend = sum of subtrahend and remainder,
∴ min. = 56212300 + 77313 = 56289613.

(33)

Since subtrahend = difference bet. min. and remainder,
∴ sub. 66304000 - 12586 = 66291414.

(34)

Gained \$1 per head.

Total gain \$305.

∴ Actual gain = \$305 - \$45 = \$260.

(35)

\$43054836

34717248

\$8337588

Ex. XII. (p. 28.)

(1)

3 = III;	18 = XVIII;	59 = LIX;
7 = VII;	25 = XXV;	62 = LXII;
11 = XI;	28 = XXVIII;	77 = LXXVII;
9 = IX;	37 = XXXVII;	84 = LXXXIV;
12 = XII;	40 = LX;	103 = CIII;
16 = XVI;	53 = LIII;	157 = CLVII;
190 = CXC;	200 = CC;	
651 = DCLI;	783 = DCLXXXIII;	
1204 = MCCIV;	1527 = MDXXVII;	
1865 = MDCCCLXV.		

(2)

III = three, or 3;	VI = six, 6;
VIII = eight, or 8;	XIII = thirteen, or 13;
XV = fifteen, or 15;	XVII = seventeen, or 17;
XX = twenty, or 20;	LIV = fifty-four, or 54;
LXXXI = eighty-one, or 81;	
CXI = one hundred and eleven, or 111;	
DCV = six hundred and five, or 605;	
VII = five thousand and two, or 5002;	
MC = one million one hundred thousand, or 1100000;	
MM = two thousand, or 2000;	
DCCXLIX = seven hundred and forty-nine, or 749;	
MDCCCLXV = one thousand eight hundred and sixty-five, or 1865.	

Ex. XIII. (p. 31.)

(45)

$$39 \times 11 = 429 \text{ bu.}$$

$$429 \times 6 = 2574 \text{ s.}$$

(46)

$$21 \times 12 = 252 \text{ pence.}$$

$$252 \times 3 = 756 \text{ pence.}$$

$$252 \times 7 = 1764 \text{ pence.}$$

$$252 \times 12 = 3024 \text{ pence.}$$

(47)

$$11 \times 23 = 253 \text{ cents.}$$

$$33 \times 9 = 297 \text{ cents.}$$

$$297 - 253 = 44 \text{ cents.}$$

(48)

$$12 \times 12 + 8 = 152.$$

$$8 \times 12 + 12 = 108.$$

$$152 - 108 = 44.$$

top.
bottom.eggs.
nuts.

oranges

inder,

inder,

36
48
—
88

(40)

$$\begin{aligned}
 57 \times 12 + 5 &= 689 \text{ B's share.} \\
 112 \times 12 + 11 &= 1355 \text{ C's share.} \\
 259 \times 12 + 9 &= 3117 \text{ D's share.} \\
 689 + 1355 + 3117 &= 5161. \\
 7401 - 5161 &= 2240 \text{ E's share.} \\
 2240 - 1355 &= 885.
 \end{aligned}$$

Ex. XIV. (p. 82.)

(18) 1st travels 93 miles per day, and 2d 79; therefore, in one day he gains $98 - 79$, or 14 miles, and in a week, or seven days, he would gain 14×7 , or 98 miles.

(19) At the end of two days, the first will have gained 14×2 , or 28 miles; then second travels in an opposite direction 5 days, or 5×79 miles = 395, while first is traveling from him 5×98 miles, or 465 miles. Therefore, whole distance apart at the end of 7 days = $28 + 395 + 465$ miles = 888 miles.

Ex. XV. (p. 34.)

(19)	(20)	(21)	(22)
495	690	417	273
370	480	739	900
34650	55200	3753	250200
1485	2760	1251	
		2919	
183150	331200		
		308163	
(23)	(24)	(25)	
904	3259	15900	
803	497	3300	
2712	22813	477	
7232	29331	477	
	13036		
725912		52470000	
	1619723		

(26)	(27)	(28)
50738	80370	47672
9706	93900	5126
304428	77733	285082
355166	77733	95344
456642		47672
	7851033000	288860
492463023		
		244366672
(29)	(30)	(31)
68196	45601	56888
2065	7823	2049
340346	500732	511892
408354	183228	227558
136218	360753	841328
	815653	
140645085	853446772	844115512
(32)	(33)	(34)
92035	84000	678000
8007	7898	876000
644245	672072	4028
736280	756081	4746
	672072	5424
736324245	588063	
	663503082	593928000000
	(35)	(36)
	90058	86108
	90003	7770
	810522	560756
810522	560756	560756
8106030522	622439160	

there-
nd in a
3 miles.
I have
in an
, while
miles.
lays =

(2)
73
900

200

KEY.

[ELEM. ARITH.]

7039
4709

63351
49273
28156

33146651

87900
9006

5374
7011

791627400

(37) 3910
350000

1955
1173

1368500000

7008005
400703

21024015
49056035
28082020

2208128627515

(39)
Sum of 493 and 312 = 809
Diff. of 493 and 312 = 184

3232
6464
808

148672 product.

(1) 973 973
63 8

2919 2919
5838 8

61299 8757
7.

61299

(39) 33000 33000
1560 13

198 99
165 33
33

51480000 429000
5

2145000
4

8580000
6

51480000

Ex. XVI.]

KEY

17

(40)

1263 3	5613 2	96732 3	67628 2
3789 2	11226 3	290196 4	135256 4
7578 6	83678 9	1160764 6	541024 8
45468	308102	6964704	4328192

Ex. XVI. (p. 34)

(1)	(2)	(3)
78689 547	275832 476	729317 6736
550823 314756 393445	1034992 1930624 1103528	4378902 2189451 5108719 4378902
43042883	131296093	4916047312
(4)	(5)	(6)
40481 936	40980 779	9264897 0584
278886 189443 418329	86837 28651 28651	37057588 74115176 46321985 88879573
43500216	31884470	88789999343

KEY.

[ELEM. ARITH.]

(7)	(8)	(9)
6707936	6078908	708670567
9878	6725	97806
59668488	30394540	4252023402
46955552	12157816	5669364536
58668488	42552356	4960693969
60871424	36478448	6378035103
66260991808	40880656800	69312233476002
(10)	(11)	(12)
6885675	27083670	25058612
2689	3709	6289
61521075	248753111	225527508
54685400	189585753	200468896
41014050	81251097	50117224
18671850	1251235411	150351672
18381180075	(14)	157593610868
(13)	(15)	(16)
8523725	9778588	79068025
2538	9867	1386
28189800	19450118	494408150
10371175	16671528	632544200
17618625	22228704	237204075
7047450	25007292	79068025
8043214050	27416327796	109588282650
(18)	(19)	(20)
79094451	5076812	15230436
764095	97613	5076812
395472255	15230436	30460872
711850059	5076812	35537684
816377804	30460872	45691308
474566706	35537684	495562849756
553661157	45691308	
60435674536845	495562849756	

Ex. xvii.]

KEY.

19

9)
70567
97806

28403
536
89
3

76003

2)
8612
6289

7508
896
24
3

868

025
386

150
00
5

50

(18)
9507340
7071

950734
6655138
6655188
67226401140

(19)
12481690
1509

11233467
6240815
1248163
18834779670

Ex. xvii. (p. 88.)

(13)
12) 800709

66725

11) 218581

19871

(14)
Divisor = dividend ÷ rem'r + quotient.
∴ divisor = $84 - 3 + 9 = 9$.
Dividend = divisor × quotient + rem'r.
∴ dividend = $11 \times 146 + 7 = 1613$.

(15)

Cost of fowls $11 \times 36 = 396$ cts.
Selling price 396 cts. + 198 cts. = 594 cts.
Selling price per fowl $594 \div 11 = 54$ cts.

(16)

9) 214

23-7 rem'r.

(17)

Greater No. = $4568 - 9 = 4554$.
∴ quotient = $4554 \div 9 = 506$.

(18)

40687
503

122061
208465

20465561

11) 93710563

8519142

∴ diff. = $20465561 - 8519142 = 11946419$.

(10)

$$\$5427 - \$1500 = \$3927.$$

Suppose cook's share = 1.

Then man-servant's sh. = 2.

Housekeeper's share = 4.

$\therefore$ total shares, 7.

$$\$3927 \div 7 = \$561.$$

$$\$561 \times 1 = \text{cook's share.}$$

$$\$561 \times 2 = \$1122, \text{ man-servant's share.}$$

$$\$561 \times 4 = \$2244, \text{ housekeeper's share.}$$

(20)

$$\text{Sum of 18 and 30} = 48.$$

$$\text{Diff. bet. 18 and 30} = 12.$$

$$48 \div 12 = 4.$$

$$\text{Product of 16 and 27} = 432.$$

$$432 \times 4 = 1728.$$

(31)

$$\begin{array}{r} 907057 \\ 6000000 \end{array}$$

$$9) 5442347442342$$

$$604705271871-3$$

$$9 - 3 = 6.$$

$$5442342$$

$$5443342$$

$$5442347442342$$

(22)

$$283 - 230 = 52.$$

$$\therefore \text{No. of oranges} = 52 \div 2 = 26.$$

(23)

$$\text{Cost of penholders } 4 \times 12 \times 10 = 480 \text{ cts.}$$

$$\text{No. of envelopes } 25 \times 20 = 500.$$

$$500 @ 16 \text{ cts. per hundred} = 16 \times 5 = 80 \text{ cts.}$$

$$480 + 80 = 560 \text{ cts.}$$

$$\text{No. of penknives} = 560 \div 16 = 35.$$

Ex. XVIII. (p. 41.)

(7)

$$256) 88832 (347$$

$$768$$

$$1208$$

$$1024$$

$$1792$$

$$1792$$

$$308) 175252 (569$$

$$1540$$

$$2125$$

$$1848$$

$$2772$$

$$2772$$

$$104) 321776 (3094$$

$$312$$

$$977$$

$$936$$

$$416$$

$$416$$

EX. XVIII.]

KEY.

(8)		
829) 658723 (1987	506) 3577936 (7071	884) 542109 (650
839	8342	5004
3247	3592	4170
2961	3542	4170
2862	500	
2622	500	
2303		
2303		

(9)		
909) 8189181 (0009	745) 4040820 (5420	883) 342004 (388
8181	3725	2040
8181	3243	7770
8181	2080	7064
	2082	7064
	2235	7064
	4470	
	4470	

(10)		
305) 7848600 (21503	678) 2839100 (3450	727) 90625 (124
730	2084	727
548	3051	1792
365	2712	1454
1836	3390	3385
1825	3390	2008
1109		477
1023		
5		

KEY.

[ELEM. ARITH.]

(11)

478) 27291888 (57096

2890

3391

3846

4588

4302

2868

2868

397) 30387310 (70542

2779

2597

2382

2153

1985

1681

1588

930

794186

703) 3273068 (4655

2812

4610

4218

3926

3515

4118

3515603

(12)

843) 87624792 (103044

843

3824

2529

7957

7587

3709

3372

3372

3372

609) 53006751 (87039

4872

4286

4268

2375

1827

5481

5481

513) 90273189 (175971

513

3897

3591

3063

2565

4981

4617

3648

3591

579

51360

(Continued on next page.)

(4655

609) 53006751 (87039

(19 continued.)

4872

4286

4263

2375

1827

5481

5481

358) 30073074 (84003

2864

1433

1432

1074

1074

652) 630762540981 (367427210

5808

4396

8912

4842

4564

2785

2808

1774

1304

4700

4564

1369

1304

658

652

61

71

KEY

[ELEM. ARITH.]

(18)

2731) 519387042 (190182

2731

24028

24579

4970

2731

22894

21848

3462

5462

2185) 10101255 (4623

8740

13612

13110

5025

4870

6555

6555

3076) 154725876 (50301

15380

9258

9228

3076

3076

7243) 632798014 (87366

57944

53358

50701

26570

21729

48411

43458

49534

434586076

1004) 2015029 (2007

2008

7029

70281

(14)

6487) 131686100 (20300

12974

19461

19461

(Continued on next page.)

Ex. XVIII.]

KEY.

25

(14 continued.)

6007) 395494875 (65889

1617) 50896184 (31853

86042

4851

85074

2186

30035

1617

50898

5691

48056

4851

28427

8403

18021

8085

54065

3284

54063

3284

2

(15)

5008) 4519559744 (902468

45072

12359

10016

23437

20032

84054

30043

40064

40064

9306) 16922858 (1754

9306

70163

65143

50265

46530

87358

87324

129

(Continued on next page.)

(15 continued.)

1579) 23617103000 (14957000
1579

7827

6818

15111

14211

9090

7895

11053

11053

2735) 2106144185 (770071
19145

19164

19145

19418

19145

2735

2735

(16)

3782) 142987420 (37810
11846

26537

26471

30634

30256

3783

3782

6016) 19554707200 (3250450
18048

15067

12032

30350

30080

27072

24064

30080

30080

(Continued on next page.)

(16 continued.)

38706) 2828882701578 (73086413
 270942

 119462

 116118

 334470

 309648

 248221

 232236

 159855

 154824

 50317

 38706

 116118

 116118

(17)

$$257 \times 553 = 142121.$$

$$142121 \div 79 = 1799.$$

(18)

$$\text{Cost of gloves, } 9 \times 12 \times 110 = 11880 \text{ cts.}$$

$$\therefore \text{No. of pairs stockings} = 11880 \div 66 = 180.$$

(19)

$$30984051 \div 288 = 107583; \text{ rem'r } 147.$$

$$\therefore \text{No. to be added} = 288 - 147 = 141.$$

(20)

$$274 + 108 = 382.$$

$$274 - 108 = 166.$$

$$382 \times 166 = 63412.$$

$$63412 \div 176 = 360; \text{ rem'r } 52.$$

(21)

$$75 \times \$4 = \$300$$

$$94 \times \$3 = \$282$$

$$106 \times \$2 = \$212$$

$$\left. \begin{array}{l} 75 \times \$4 = \$300 \\ 94 \times \$3 = \$282 \\ 106 \times \$2 = \$212 \end{array} \right\} = \$794.$$

$$\text{He wishes to realize } \$794 + \$147, \text{ or } \$941.$$

$$\$941 \div 275 (\text{whole No. of sheep}) = \$3\frac{11}{25}.$$

(22) Gain, \$267

Buying price, \$1068 - \$267 = \$801
 \$801 + 267 = \$3.

(23) $102 + 29 + 267 = 399.$ $399 + 19 = 21.$ $21 \times 57 = 1197.$ $1197 - 197 = 1000.$

(24)

1 lamb is worth $16 + 8 = \$2.$ 1 sheep is worth $60 + 15 = \$4.$ 840 lambs cost $840 \times \$2 = \$1680.$ $\therefore$ No. of sheep = $\$1680 \div 4 = 420.$

(25)

 $87403 - 355 = 87048.$ $87048 + 216 = 403.$

(26)

 $154970553 + 416 = 372547.$

(27)

 $479632 - 20 = 479612.$ $479612 + 28 = 17129.$

(28)

Cost of keeping 29 bullocks 3 months @ \$5 = \$435.

 $\therefore \$1865 + \$435 = \$2320 = \text{whole cost.}$ $\therefore \$2610 - \$2320 = \$290 = \text{whole gain.}$ $\therefore \$290 \div 29 = \$10 = \text{gain per bullock.}$

Ex. XIX. (p. 43.)

(4)

9067) 806753245 (88976 ~~1111~~

72536

81393

72536

88572

81603

69694

69489

62255

54402

7852

(5)

70602) 612709066 (8678 ~~1111~~

564816

478930

438012

553186

494214

589726

564816

24910

M. ARITH.

EX. XII.]

KEY.

(6)

896) 60005886 (66970 111

5376

6245

5376

8698

8064

6343

6279

716

(7)

9286) 70867509 (7006 1111

69902

96550

89874

66769

59916

6853

(8)

868) 8673456954 (9992461 111

7812

8614

7812

8025

7812

2136

1736

4009

3472

5375

5208

1674

868

806

(9)

93256) 200000788 (2144 1111

186512

124947

98256

416918

373024

438943

373024

65919

KEY.

[ELEM. ARITH.]

(10)

14609
719

181481
14609
102268

10503871

8067) 10503871 (1302 ⁸³⁷/₈₀₆₇

8067

24368

24201

16771

16134

637

Ex. XX. (p. 51.)

(1)

£ s d
700 16 8
20

14196 s
12

170360 d.
4

681440 g.

(2)

mls. fur. ft. in.
17 1 2 6
8

137 fur.
40

5480 poles.
5½

27400
2740

30140 yds.
8

90422 ft.
12

1085070 in.

ARITH.

2 337
8967

in.
6

Ex. xx.]

KEY.

81

(8)
tons. cwt. qrs. lbs.
8 2 3 5
20

162 cwt.
4

651 qrs.
25

3260
1302

16280 lbs.
16

97680
16280

260480 oz.
16

1562880
260480

4167680 dra.

(4)
ac. r. sq. p. s. yd.
612 2 0 274

2450 r.
40

98000 p.
804

29460274
24500

29645274 yds.
9

266807474 ft.
144

106722988
106722988
26680747

3842027568
72

3842027640 in.

KEY.

[ELEM. ARITH.]

(5)

mls.	fur.	po.	yds.	ft.	in.	ls.
10	5	5	5	0	5	5
8						
85 fur.						
40						
8405 p.						
5½						
17080						
1702½						
18782½ yds.						
8						
56197½						
12						
674875 ft.						
12						
8092595 in.						

(6)

ac.	r.	per.	yds.
5	0	8	29
4			
20 r.			
40			
803 p.			
80½			
24119			
200½			
24819½ yds.			
9			
218877½ ft.			
144			
875508			
875508			
218877			
31518288			
108			
31518396			

(7)

17 days.
24
69
34
408 hrs.
60
24480 min.

er. yds.
29

(8)
lbs. oz. dra. scr. grs.
2 11 0 0 20
13
—
35 oz.
8
—
280 dra.
3
—
840 scr.
20
—
16820 grs.

(10)
cub. yds. ft. in.
23 0 1000
27
—
161
46
—
621 ft.
1728
—
5968
1243
4347
631
—
1074088 in.

(12)
220 bush.
4
—
880 pks.
2
—
1760 galls.
4
—
7040 qts.

(9)
lea. mls. fur.
2 2 7
3
—
8 mls.
8
—
71 fur.
40
—
2840 per.
54
—
14200
1420
—
15620 yds.

(11)
galls. qts.
13 8
4
—
55 qts.
2
—
110 pts.
4
—
440 gills.

(13)

yrs.	dys.
3	315

 365

 15

 18

 9

 1095

 315

 1410 dys.

 24

 5640

 2820

 33840 hrs.

 60

 2030400 min.

(14)

lbs.	oz.	dwt.
27	5	16

 12

 329 oz.

 20

 6596 dwt.

 24

 26384

 13192

 158304 grs.

(15)

lbs.	oz.	drs.	sc.
47	11	6	2

 12

 575 oz.

 8

 4606 drs.

 3

 13820 sc.

 20

 276400 gi.

(16)

£	s.	d.
200	17	8½

 20

 4017 s.

 13

 48212 d.

 2

 26425 ½ d.

(17)

ac.

219

4

r.

2

per.

16

878 ro.

40

35186 per.

304

1054080

8784

1062864 yds.

(18)

yds.

218

4

qrs.

2

nls.

3

874 qrs.

4

3490 nls.

(19)

£

2376

20

s.

10

d.

84

47589 s.

12

570476 d.

4

2281906 q.

(20)

cwt.

216

4

qrs.

2

lbs.

17

866 qrs.

25

4347

1732

21667 lbs.

(21)

25°

60

36'

1536'

60

92160'

KEY.

[ELEM. ARITH.]

mls.	fur.	(22) per.	yds.
8	3	0	4
8			

(23)

s.	d.
17	6 1/2

07 fur.
40

6257 8.
12

(24)

2680 per.
54

75090 d.
4

105
12

13404
1340

800362 q.

1260 oz.
20

14744 yds.
8

(25)
E. ells.
28
5

25200 dwt.
24

44282 ft
12

130 qrs.
4

100800
50400

580784 in.

520 nls

604800 grs.

(26)
Fr. ells.
37
6

£ 578 8 6 1/2

11840 s.
12

(28)
lbs. oz.
287 6
12

228 grs.

136086 d.
4

(30)

8.	2.
19	64

888 nls.

544345 g.

3450 oz.
8

(29)
pipes.
8
2

4019 s.
12

27600 drs.
3

6 hhds.

48234 d.
4

82800 SC.

63

192938 *g.*

378⁴ galls.

Ex. XXI. (p. 53.)

(1) 4) 123290 *farthings* (2) 24) 18172 *grains*

12) 30822 — $\frac{1}{2}$ d. 20) 548 — 20 grs.

20) 2568 — s. 6 d. 12) 27 — 8 dwt.

£128 8 s. 6 $\frac{1}{2}$ d. 2 lbs. 8 oz. 8 dwt. 20 grs.

(3) 2) 18191 *pints*

(4) *mokes* 4) 9095 — 1 pt.

12) 76787508

2273 galls. 3 qts. 1 pt.

3) 6398964

54) 2132988 — yds.
2 2

11) 4265976

40) 387816

8) 9695 — 16 poles.

3) 1211 — 7 fur.

408 lea. 2 mls. 7 fur. 16 poles.

(5) 16) 2007008 *g*

(6) 40) 98827 *per*

16) 125438

4) 2345 r. — 27 per.

25) 7889 — 14 oz.

586 a. 1 r. 27 per.

4) 313 — 14 lbs.

20) 78 — 1 qr.

3 tons. 18 cwt. 1 qr. 14 lbs. 14 oz.

KEY.

[ELEM. ARITH.]

(7)

24) 167812 *grs*

20) 6992 — 4 grs.

12) 849 — 12 dwt.

29 lbs. 1 oz. 12 dwt. 4 grs.

(8)

12) 8756765637 *lines*

12) 729780469 — 9 lines.

3) 60810872 — 5 inches.

$$\begin{array}{r} 154) 20370290 \\ \underline{2} \quad \underline{2} \end{array}$$
 — 2 ft.

11) 40540530

40) 8685507 — 1½ yds.

8) 92187 — 27 poles.

11517 mls. 1 fur. 27 p. 2 yds. 0 ft. 11 in. 9 ls.

(9)

16) 7678678956 *drs*

16) 479917434 — 12 drs.

25) 29994839 — 10 oz.

4) 1109793 — 14 lbs.

20) 299948 — 1 qr.

14997 ts. 8 cwt. 1 qr. 14 lbs. 10 oz. 12 drs.

(10)
12) 121603 *miles*

8) 10188 ft. - 9 in.

54) 3377 - 2 ft.
2 2

11) 6754

40) 614

8) 15 - 14 po.

1 ml. 7 fur. 14 p. 0 yds. 2 ft. 9 in.

(12)
10) 2022752 *drs*

16) 126422

25) 7901 - 6 oz.

4) 816 - 1 lb.

20) 79 - 0 qrs.

3 tons. 19 cwt. 0 qrs. 1 lb. 6 oz.

(14)
60) 1727893 *sec*

60) 28798 - 13 sec.

24) 479 - 58 min.

7) 19 - 23 hrs.

2 wk. 5 dy. 23 hr. 58' 13"

(11)
24) 98006 *qrs*

20) 4088 - 14 grs.

12) 204 - 3 dwt.

17 lbs. 0 oz. 3 dwt. 14 grs.

(13)
20) 702917 *qrs*

3) 85145 - 17 grs.

8) 11715 - 0 sc.

12) 1464 - 3 dr.

122 lb. 0 oz. 3 dr. 0 sc. 17 gr.

(15)
304) 172425 *yds sq*
4 4

121) 689700

40) 5700 sq. poles.

4) 142 r. - 20 sq. poles.

35 a. 12 r. 20 sq. po.

40

KEY.

[ELEM. ABITH.

(16) *cut in* (17) *sq in*
 1728) 13856883 144) 1244180000

27) 8019 cub. ft. 9) 8640000 sq. ft.

297 cub.yds. 204) 960000
 4 4

(18) 4) 500 *nils* 121) 3840000

4) 125 40) 31735 - 16½ sq. yds.

31 yds. 1 qr. 4) 798 r. - 15 sq. per.

198 a. 1 r. 15 s. p. 16½ s. yds.

(19) 69) 181073 *sec* (20) 69) 81557609 *sec*

69) 2184 min. - 33 sec. 69) 525969 min.

36 hrs. 24 min. 35 sec. 24) 9766 hrs.

365 dys. 6 hrs.

(31) 3) 219612 *pts* (32) 2) 800738 *pts*

4) 109806 qts. 4) 150369 qts.

54) 27451 galls. 2 qts. 63) 37592 galls. 1 qt.

508 hhds. 19 gals. 2 qts. 596 hhds. 44 gals. 1 qt.

(33) 60) 912715 *ll* (34) 34) 1000000 *ll* (35) 60) 7263 *ll*

15211 bu. 55 lbs.

29411 bu. 26 lbs. 121 bu. 3 lbs.

ARITH.

Ex. XXI, XXV.]

KEY.

41

(26)
\$307.47

(27)
4) 978647 *faithfully*

19) 248411 d. - 3 q.

20) 20284 s. - 3½ d.

£1014 . 4 s. 3½ d.

Ex. XXV. (p. 59.)

ls.

er.

16½ s. yds.

(15) (10)

lbs.	oz.	dwt.	grs.	£	s.	d.
6	2	3	17 × 2	18	7	4½
			10			11

61	9	17	2 × 8	147	1	4½
			10			5

618	2	10	20 × 8	735	6	9½
			10			5

6182	1	8	8	3670	13	10½
			5			

30910	7	1	16
-------	---	---	----

1854	7	12	12
------	---	----	----

494	6	16	16
-----	---	----	----

12	4	7	10
----	---	---	----

33272	1	18	6
-------	---	----	---

s. 1 qt.

(17)

ac.	r.	per.	yds.	ft.	in.
20	2	17	15	3	3
					8

164	3	20	1	6	2½
					8

1319	0	0	13	4	48
------	---	---	----	---	----

3 lbs.

(18)

mls.	fur.	per.	yds.	ft.	in.
2	6	2	3	0	5
13	6	12	4	2	1
68	7	24	1	1	1
344	6	1	14	1	1
1084	2	4	0	0	8

(19)

£	s.	d.
2	6	8½
23	6	10½
233	8	9
2100	18	9

(20)

\$237.15
100
\$23715.00
5
\$118575.00

(21)

bu.	pk.	galls.
10	2	1
106	1	0
1062	2	0
8500	0	0

Ex. XXVI. (p. 61.)

(1)				(2)			
cwt.	qrs.	lbs.	oz.	lbs.	oz.	dwt.	grs.
3	3	21	5	6	2	8	17
			10				10
39	2	13	2	61	9	17	2
			8				10
317	0	5	0	618	2	10	20
35	2	16	13				10
352	2	21	13	6182	1	8	8
							5
				30910	7	1	16
				2472	10	8	8
				370	11	2	12
				18	6	11	3
				38772	10	18	15

(3)			(4)				
£	s.	d.	cwt.	qrs.	lbs.	oz.	drs.
2	6	9 $\frac{1}{4}$	2	3	23	6	7
		10					10
23	7	11	29	3	9	0	6
		10					10
233	19	2	298	1	15	3	12
		9					6
2105	12	6	1790	1	16	6	8
70	3	9	59	2	18	0	12
18	14	4	20	3	13	13	1
2194	10	7	1870	3	23	4	5

KEY.

[ELEM. ARITH.]

(5)

£	s.	d.
4	18	9½
		10
49	7	11
		10
493	19	2
		5
2469	15	10
296	7	6
4	18	9½
2771	2	1½

(6)

lbs.	oz.	drs.	sc.	grs.
15	2	3	2	7
				10
152	0	5	2	10
				10
1520	7	2	1	0
				7
10644	3	0	1	0
152	0	5	2	10
30	4	7	1	14
10826	8	5	2	4

(7)

\$2.25

209

2025

450

\$470.25

(8)

\$1.27

52

254

635

\$66.04

(9)

1625 cts.

6

\$97.50

(10)

qrs.	lbs.	oz.
1	17	8
		10
17	0	0
		2
34	0	0
15	7	8
cwt. 12	1	7
		8

(11)

100000

40

\$40000.00

Ex. XXVII. (p. 63.)

grs.
7
10
10
0
7
0
10
14
4

(1)
£ s. d.
5) 278 . 15 . 8
55 . 15 . 13½

(2)
lbs. oz. dwt. grs.
8) 237 . 5 . 6 . 0
29 . 8 . 3 . 6

(3)
mls. fur. per yds. ft. in.
9) 217 . 5 . 16 . 2 . 0 . 0
24 . 1 . 19 . 3 . 10 . 10

(4) (5)
yds. qrs. nls. lbs. oz. drs. sc. grs.
5) 115 . 2 . 2 6) 865 . 9 . 0 . 2 . 10
23 . 0 . 2 144 . 3 . 4 . 0 . 8½ = 1

(6)
£ s. d.
11) 2078 . 17 . 11½
188 . 19 . 9½

(7)
tons. cwt. qrs. lbs. oz. drs.
9) 67 . 13 . 1 . 17 . 0 . 0
3) 7 . 10 . 1 . 13 . 0 . 0
2 . 10 . 0 . 12 . 10 . 10½

(8)
ac. rds. per. yds. ft. in.
7) 976 . 2 . 19 . 25 . 0 . 0
8) 139 . 2 . 2 . 25 . 1 . 87-3 rem.
17 . 1 . 30 . 10 . 6 . 55-7 rem.
7 × 7 + 3 = 52, true rem.
½ = 1½

KEY.

[ELEM. ARITH.]

cwt. qrs. (9) lbs. oz. drs.
 705) 612 0 17 0 2 (3 qrs.
 4

2448

2115

333

25

1682

666

8342 (11 lbs.

705

1292

705

587

16

3522

587

9392 (13 oz.

705

2342

2115

227

16

1364

227

3634 (54 $\frac{2}{3}$ drs.

3525

109

Ans.—3 qrs. 11 lbs. 13 oz. 54 $\frac{2}{3}$ drs.

(10)
 mls. fur. yds.
 1247) 8627 6 2 (7 fur.
 7482

1145

8

9166

8729

437

40

17480 (14 per.

1247

5010

4988

22

54

112

11

123 (0 yds.

3

369 (0 ft.

12

4428 (3 $\frac{2}{3}$ in.

3741

687

Ans.—7 fur. 14 per. 3 $\frac{2}{3}$ in.

(11)

	bu.	pks.	gall.	qts.	pts.	
12)	612	2	1	2	0	
8)	51	0	0	1	1	rem. - 8
	6	1	1	0	0	rem. - 8
	$3 \times 12 + 8 = 44$, true rem.					

(12)

	£	s.	d.
9)	2851	16	4½
6)	316	17	4½
	52	16	2½

(13)

	lbs.	oz.	drs.	sc.	grs.
57)	247	10	7	1	0 (4 lbs.)
	228				
	19				
	12				
	238 (4 oz.				
	228				
	10				
	8				
	87 (1 dr.				
	57				
	30				
	3				
	91 (1 sc.				
	57				
	34				
	20				
	680 (11½ grs.				
	627				
	53				

Ans.—4lbs. 4oz. 1 dr. 1 sc. 11½ grs.

KEY.

[ELEM. ARITH.]

$$\begin{array}{r} (14) \\ \text{mls.} \quad \text{fur.} \quad \text{per.} \\ 211) 200 \quad . \quad 3 \quad . \quad 6 (7 \text{ fur.} \\ \quad \quad \quad 8 \end{array}$$

 1603

 1477

 126

 40

 5046 (23 per.

 422

 826

 633

 193

 5 $\frac{1}{2}$

 965

 96 $\frac{1}{2}$

 1061 $\frac{1}{2}$ (5 yds.

 1055

 6 $\frac{1}{2}$

 3

 19 $\frac{1}{2}$

 12

 234 (1 in.

 211

 23

 12

 276 (1 $\frac{44}{11}$ ls

 211

 65

Ans.—7 fur. 23 per. 5 yds. 1 in. 1 $\frac{44}{11}$ ls.

	ac.	r.	(15) per.	yds.	
318)	416	3	19	7 (1 ac.	
	318				
	98				
	4				
	395 (1 ro.				
	318				
	77				
	40				
	3099 (9 per.				
	2862				
	237				
	30 $\frac{1}{2}$				
	7117				
	59 $\frac{1}{2}$				
	7176 $\frac{1}{2}$ (22 yds.				
	636				
	816 $\frac{1}{2}$				
	636				
	180 $\frac{1}{2}$				4608
	9				36
	1622 $\frac{1}{2}$ (5 ft.				4644 (14 $\frac{1}{3}$ $\frac{2}{3}$ in.
	1590				318
	32 $\frac{1}{2}$				1464
	144				1272
	128				192
	128				318
	32				

Ans.—1 ac. 1 ro. 9 per. 22 yds. 5 ft. 14 $\frac{1}{3}$ $\frac{2}{3}$ in.

KEY.

[ELEM. ARITH.

(16)
 tons. cwt. qrs.
 564) 614 2 3 (1 ton.
 564

50
 20

1002 (1 cwt.
 564

438
 4

1755 (3 qrs.
 1692

63
 25

315
 126

1575 (2 lbs.
 1128

447
 16

2682
 447

7152 (12 oz.
 564

1512
 1128

384
 16

2304

2304
 384

6144 (10 $\frac{2}{3}$ drs.
 5640

504

(17)
 c. yds. c. ft. c. in.
 169) 917 9 100 (5 c. yds.
 845

72
 27

513
 144

1953 (11 c. ft.
 169

263
 169

94
 1728

852
 188
 658
 94

162532 (961 $\frac{2}{3}$ c. in.
 1521

1043
 1014

292
 160
 123

(18)
 lbs. oz. drs. sc.
 212) 926 5 3 2 (4 lbs.
 848

78
 12

941 (4 oz.
 848

93
 8

747 (3 drs.
 636

111
 3

335 (1 sc.
 212

123
 20

2460 (11 $\frac{1}{2}$ $\frac{1}{2}$ grs.
 212

340
 212

128

(20)

£	s.	d.
758) 1914	10	5 (£2)
1516		

398
20

7970 (10s.
7580

390
12

4685 (6½d.
4548

3 137
Ans.—£2 10s. 6½d.

(21)

£	s.	d.
317) 215	12	6½ (13s. 7½d.
20		

4312
317

1142
951

191
12

2298 (7d.
2219

79
4

317 (¼ q.
317

Ans.—13s. 7½d.

(19)

lbs.	dwt.
634) 3068	8 (4 lbs.
2586	

532
12

6384 (10 oz.
6340

44
20

888 (1 dwt.
634

254
24

1016
508

6096 (9¾ grs.
5706

390

Ans.—4 lbs. 10 oz. 1 dwt.
9¾ grs.

d.
5 (£2)

(22)
yrs. dys. hrs. min.
397) 125 127 16 47 (115 days.

365

752

750

375

45752

397

605

397

2082

1985

97

24

404

194

2344 (5 hrs.

1985

350

60

21587 (54 min.

1985

1737

1588

140

60

8940 (22333 sc.

794

1000

794

206

Ans.—115 dys. 5 hrs. 54'. 22333''.

(23)

267) \$2267.84 (\$8.49111.

2136

1318

1068

2504

2403

101

(24)

425) \$5693.75 (\$13.39111.

425

1443

1275

1687

1275

4125

3825

300

$$\begin{array}{r} (25) \\ 365) \$600.00 (\$1.64\frac{1}{2}\frac{1}{2} \\ \underline{365} \end{array}$$

$$\begin{array}{r} 2350 \\ 2190 \\ \hline \end{array}$$

$$\begin{array}{r} 1600 \\ 1460 \\ \hline \end{array}$$

$$140 \quad 365 - 52 = 313.$$

$$\begin{array}{r} 313) \$600.00 (\$1.91\frac{1}{2}\frac{1}{2} \\ \underline{313} \end{array}$$

$$\begin{array}{r} 2870 \\ 2817 \\ \hline \end{array}$$

$$\begin{array}{r} 530 \\ 313 \\ \hline \end{array}$$

$$217$$

$$\begin{array}{r} (27) \\ 57) \$65.55 (\$1.15 \\ \underline{57} \end{array}$$

$$85$$

$$57$$

$$285$$

$$285$$

$$\begin{array}{r} (26) \\ 57) \$265.05 (\$4.65 \\ \underline{228} \end{array}$$

$$\begin{array}{r} 370 \\ 342 \\ \hline \end{array}$$

$$\begin{array}{r} 285 \\ 285 \\ \hline \end{array}$$

$$\begin{array}{r} (28) \\ 52) \$132.00 (\$2.53\frac{1}{2}\frac{1}{2} \\ \underline{104} \end{array}$$

$$280$$

$$260$$

$$200$$

$$156$$

$$44$$

Ex. XXVIII. (p. 64.)

$$\begin{array}{ll} (1) & (2) \\ \text{£}684 \text{ 7s. 6d.} = 164250\text{d.} & \text{£}171 \text{ 1s. 10\frac{1}{2}\text{d.}} = 82125\frac{1}{2}\text{d.} \\ \text{£}76 \text{ 0s. 10d.} = 18250\text{d.} & \text{£}57 \text{ 0s. 7\frac{1}{2}\text{d.}} = 27375\frac{1}{2}\text{d.} \\ 164550 \div 18250 = 9 \text{ times.} & 82125 \div 27375 = 3 \text{ times.} \end{array}$$

$$\begin{array}{l} (3) \\ 9 \text{ lbs. 9 oz. 3 dwt. 12 grs.} = 56244 \text{ grs.} \\ 5 \text{ dwt. 9 grs.} = 129 \text{ grs.} \\ 56244 \div 129 = 436 \text{ times.} \end{array}$$

4.65

$$\begin{aligned} & \text{(4)} \\ & 4 \text{ mls. } 1 \text{ fur. } 2 \text{ yds.} = 21786 \text{ ft.} \\ & 1 \text{ ml. } 3 \text{ fur. } 2 \text{ ft.} = 9262 \text{ ft.} \\ & 21786 \div 9262 = 3 \text{ times.} \end{aligned}$$

$$\begin{aligned} & \text{(5)} \qquad \qquad \qquad \text{(6)} \\ & 6 \text{ cwt. } 2 \text{ qrs.} = 10400 \text{ oz.} \quad 13 \text{ lbs. } 6 \text{ oz. } 2 \text{ sc.} = 72040 \text{ gr.} \\ & 1 \text{ qr. } 3 \text{ oz.} = 403 \text{ oz.} \quad 1 \text{ lb. } 6 \text{ oz. } 2 \text{ sc. } 10 \text{ grs.} = \\ & 10400 \div 403 = 25\frac{1}{3} \text{ times.} \quad 8690 \text{ grs.} \\ & \qquad \qquad \qquad 72040 \div 8690 = 8\frac{1}{3} \text{ times.} \end{aligned}$$

$$\begin{aligned} & \text{(7)} \qquad \qquad \qquad \text{(8)} \\ & 3 \text{ yds. } 1 \text{ qr. } 2 \text{ nls.} = 54 \text{ nls.} \quad 1 \text{ dy. } 1 \text{ hr. } 12 \text{ min.} = 1512 \text{ min.} \\ & 1 \text{ qr. } 2 \text{ nls.} = 6 \text{ nls.} \quad 1 \text{ hr. } 3 \text{ min.} = 63 \text{ min.} \\ & 54 \div 6 = 9 \text{ times.} \quad 1512 \div 63 = 24 \text{ times.} \end{aligned}$$

$$\begin{aligned} & \text{(9)} \\ & 5\text{s. per. } 7 \text{ yds. } 108 \text{ in.} = 205200 \text{ in.} \\ & 2 \text{ yds. } 1 \text{ ft.} = 2736 \text{ in.} \\ & 205200 \div 2736 = 75 \text{ times.} \end{aligned}$$

$$\begin{aligned} & \text{(10)} \qquad \qquad \qquad \text{(11)} \\ & \$141.05 = 14105 \text{ cts.} \quad \$221.00 = 22100 \text{ cts.} \\ & \$ 2.17 = 217 \text{ cts.} \quad \$ 2.21 = 221 \text{ cts.} \\ & 14105 \div 217 = 65 \text{ times.} \quad 22100 \div 221 = 100 \text{ times.} \end{aligned}$$

344

Ex. XXIX. (p. 65.)

$$\begin{aligned} & \text{(1)} \\ & \begin{array}{r} £25 \times 4 = \$100.00 \\ 6\text{s.} \times 20 = 1.20 \\ 3\text{d.} = 12 \text{ q.} \times 5 \div 12 = .05 \\ \hline \$101.25 \end{array} \end{aligned}$$

$$\begin{aligned} & \text{(2)} \\ & \begin{array}{r} £57 \times 4 = \$228.00 \\ 19\text{s.} \times 20 = 3.80 \\ 3\text{d.} = 12 \text{ q.} \times 5 \div 12 = .05 \\ \hline \$231.85 \end{array} \end{aligned}$$

$$\begin{aligned} & \text{(3)} \\ & \begin{array}{r} £207 \times 4 = \$828.00 \\ 17\text{s.} \times 20 = 3.40 \\ 8\text{d.} = 32 \text{ q.} \times 5 \div 12 = .13\frac{1}{3} \\ \hline \$831.53\frac{1}{3} \end{array} \end{aligned}$$

54d.

54d.

mes.

$$\begin{array}{rcl}
 & (4) & \\
 £153 & \times 4 = & \$612.00 \\
 18s. & \times 20 = & 3.60 \\
 5d. = 20 q. \times 5 + 12 = & & .08\frac{1}{2}
 \end{array}$$

\$615.68 $\frac{1}{2}$

$$\begin{array}{rcl}
 & (5) & \\
 £217 & \times 4 = & \$868.00 \\
 17s. \times 20 = & & 3.40 \\
 \hline
 & & \$871.40
 \end{array}$$

$$\begin{array}{rcl}
 & (6) & \\
 £319 & \times 4 = & \$1276.00 \\
 15s. \times 20 = & & 3.00 \\
 7\frac{1}{2}d. = 30 q. \times 5 + 12 = & & .12\frac{1}{2}
 \end{array}$$

\$1279.12 $\frac{1}{2}$

$$\begin{array}{rcl}
 & (7) & \\
 £612 & \times 4 = & \$2448.00 \\
 19s. \times 20 = & & 3.80 \\
 11\frac{1}{2}d. = 45 q. \times 5 + 12 = & & .18\frac{1}{2}
 \end{array}$$

\$2451.98 $\frac{1}{2}$

$$\begin{array}{rcl}
 & (8) & \\
 £63 & \times 4 = & \$252.00 \\
 9s \times 20 = & & 1.80 \\
 9\frac{1}{2}d. = 39 q. \times 5 + 12 = & & .16\frac{1}{2}
 \end{array}$$

\$253.96 $\frac{1}{2}$

$$\begin{array}{rcl}
 & (9) & \\
 £912 & \times 4 = & \$3648.00 \\
 12s. \times 20 = & & 2.40 \\
 6d. = 24 q. \times 5 + 12 = & & .10
 \end{array}$$

\$3650.50

$$\begin{array}{rcl}
 & (10) & \\
 £711 & \times 4 = & \$2844.00 \\
 5s. \times 20 = & & 1.00 \\
 5\frac{1}{2}d. = 22 q. \times 5 + 12 = & & .09\frac{1}{2}
 \end{array}$$

\$2845.09 $\frac{1}{2}$

$$\begin{array}{rcl}
 & (11) & \\
 £1117 & \times 4 = & \$4468.00 \\
 7\frac{1}{2}d. = 30 q. \times 5 + 12 = & & .12\frac{1}{2}
 \end{array}$$

\$4468.12 $\frac{1}{2}$

(12)

$$£47 \times 4 = \$188.00$$

$$7 \text{ s.} \times 20 = 1.40$$

$$9 \text{ d.} = 36 \text{ q.} \times 5 + 12 = .15$$

$$\$189.55$$

(13)

$$£2017 \times 4 = \$8068.00$$

$$6 \text{ s.} \times 20 = 1.20$$

$$8 \text{ d.} = 32 \text{ q.} \times 5 + 12 = .13\frac{1}{2}$$

$$\$8069.33\frac{1}{2}$$

(14)

$$£75 \times 4 = \$300.00$$

$$9 \text{ s.} \times 20 = 1.80$$

$$8\frac{1}{2} \text{ d.} = 34 \text{ q.} \times 5 + 12 = .14\frac{1}{2}$$

$$\$301.94\frac{1}{2}$$

(15)

$$£37 \times 4 = \$148.00$$

$$18 \text{ s.} \times 20 = 3.60$$

$$7\frac{1}{2} \text{ d.} = 30 \text{ q.} \times 5 + 12 = .12\frac{1}{2}$$

$$\$151.72\frac{1}{2}$$

(16)

$$£87 \times 4 = \$348.00$$

$$13 \text{ s.} \times 20 = 2.60$$

$$9 \text{ d.} = 36 \text{ q.} \times 5 + 12 = .15$$

$$\$350.75$$

Ex. XXX. (p. 66.)

(1)

$$\$217 \div 4 = £54 + \$1$$

$$125 \text{ cts.} \div 20 = 6 \text{ s.} + 5 \text{ cts.}$$

$$5 \text{ cts.} \times 3 \div 5 = 3 \text{ d.}$$

$$£54 \quad 6 \text{ s.} \quad 3 \text{ d.}$$

(3)

$$\$17 \div 4 = £4 + \$1$$

$$135 \text{ cts.} \div 20 = 6 \text{ s.} + 15 \text{ cts.}$$

$$15 \text{ cts.} \times 3 \div 5 = 9 \text{ d.}$$

$$£4 \quad 6 \text{ s.} \quad 9 \text{ d.}$$

(2)

$$\$327 \div 4 = £81 + \$3$$

$$355 \text{ cts.} \div 20 = 17 \text{ s.} + 15 \text{ cts.}$$

$$15 \text{ cts.} \times 3 \div 5 = 9 \text{ d.}$$

$$£81 \quad 17 \text{ s.} \quad 9 \text{ d.}$$

(4)

$$\$84 \div 4 = £21.$$

$$50 \text{ cts.} \div 20 = 2 \text{ s.} + 10 \text{ cts.}$$

$$10 \text{ cts.} \times 3 \div 5 = 6 \text{ d.}$$

$$£21 \quad 2 \text{ s.} \quad 6 \text{ d.}$$

(5)

$$\begin{aligned} \$75 + 4 &= £18 + \$3 \\ 395c. \div 20 &= 19s. + 15c. \\ 15c. \times 3 \div 5 &= 9d. \\ &£18 \ 19s. \ 9d. \end{aligned}$$

(6)

$$\begin{aligned} \$125 + 4 &= £31 + \$1 \\ 137\frac{1}{2}c. \div 20 &= 6s. + 17\frac{1}{2}c. \\ 17\frac{1}{2}c. \times 3 \div 5 &= 10\frac{1}{2}d. \\ &£31 \ 6s. \ 10\frac{1}{2}d. \end{aligned}$$

(7)

$$\begin{aligned} \$867 + 4 &= £216 + \$3 \\ 387\frac{1}{2}c. \div 20 &= 19s. + 7\frac{1}{2}c. \\ 7\frac{1}{2}c. \times 3 \div 5 &= 4\frac{1}{2}d. \\ &£216 \ 19s. \ 4\frac{1}{2}d. \end{aligned}$$

(8)

$$\begin{aligned} \$1162 + 4 &= £290 + \$2 \\ 240c. \div 20 &= 12s. \\ &£290 \ 12s. \end{aligned}$$

(9)

$$\begin{aligned} \$1393 + 4 &= £348 + \$1 \\ 162\frac{1}{2}c. \div 20 &= 8s. + 2\frac{1}{2}c. \\ 2\frac{1}{2}c. \times 3 \div 5 &= 1\frac{1}{2}d. \\ &£348 \ 8s. \ 1\frac{1}{2}d. \end{aligned}$$

(10)

$$\begin{aligned} \$1937 + 4 &= £484 + \$1 \\ 120c. \div 20 &= 6s. \\ &£484 \ 6s. \end{aligned}$$

(11)

$$\begin{aligned} \$2220 + 4 &= £555 \\ 29c. \div 20 &= 1s. + 9c. \\ 9c. \times 3 \div 5 &= 5\frac{1}{2}d. \\ &£555 \ 1s. \ 5\frac{1}{2}d. \end{aligned}$$

(12)

$$\begin{aligned} \$3785 + 4 &= £946 + \$1 \\ 148c. \div 20 &= 7s. + 8c. \\ 8c. \times 3 \div 5 &= 5\frac{1}{2}d. \\ &£946 \ 7s. \ 5\frac{1}{2}d. \end{aligned}$$

Ex. XXXI. (p. 66.)

PAPER I.

(1)

$$\begin{array}{r} 35700 \\ 24191 \\ 18777 \\ 18129 \\ 21187 \\ \hline 117984 \end{array}$$

(2)

$$\begin{array}{r} 55146 \\ 23503 \\ 9889 \\ 6275 \\ 8369 \\ 4584 \\ \hline 107766 \end{array}$$

(3)

$$\begin{array}{r} 100000 \\ 229713 \\ 58705 \\ 612517 \\ 999999 \\ 833719 \\ 768309 \\ \hline 50050 \\ \hline 3653013 \end{array}$$

(4)	(5)
5005	12) 178006
7018	
17915	3) 14833 - 10 in.
28719	
9012	4944 - 1 ft.
807512	5½ { 2
717017	(11) 9888
93502	
212607	40) 898 - 10 hf. yds. = 5 yds.
1898307	8) 22 - 18 per.
	2 - 6 fur.

ANS.—2 mls., 6 fur., 18 per., 5 yds., 1 ft., 10 in.

$$\begin{aligned}
 (6) \\
 \$ 8375180.20 + 1493332 &= \$ 5.60 \text{ and a fraction.} \\
 \$ 43054836.00 + 2506755 &= \$ 17.17 \quad " \quad " \\
 \$ 17.17 - \$ 5.60 &= \$ 11.57
 \end{aligned}$$

PAPER II.

(1)	(2)
8s. 10½d. × 818	67 × \$1.62 = \$108.54
10	82c. × 13½ = \$ 11.07
£4 8s. 9d.	\$11.07 + \$18 + \$16 = \$ 45.07 =
10	Total amount expended,
£44 7s. 6d.	\$108.54 - \$45.07 = \$63.47
8	
£355 0s. 0d.	
4 8s. 9d.	
3 11s. 0d.	
£362 19s. 9d.	

(3)
 ac. ac. r. per. yds. ft.
 897) 72812 (183 1 24 20 7 $\frac{1}{4}$
 897

8311
 8176

(4)
 $160 \times \$1.60 = \256.00
 $\$256 \div 27 = \$9.48\frac{1}{2}$

1352
 1191

161
 4

(5)
 $42\frac{1}{2} \text{ yds.} + 8\frac{1}{2} = 5$
 $8\frac{1}{2} \times 6\text{s. } 6\frac{1}{2}\text{d.} = £2 \text{ 15s. } 7\frac{1}{2}\text{d.}$

644 (1 ro.
 897

247
 40

(6)
 Amt. rec'd = £1 18s. 9d. $\times$ 618
 = £1042 17s. 6d. = \$4171.50

$84 \times 17\text{c.} = \14.28

$3\text{s. } 9\text{d.} \times 5 = 18\text{s. } 9\text{d.} = 3.75$

$£1 \text{ 15s.} \times 2 = £3 \text{ 10s.} = 14.00$

$£2 \text{ 11s. } 9\text{d.} \times 8 = £20 \text{ 14s.} = 82.80$

$£12 \text{ 10s. } 9\text{d.} \times 15 = £194 \text{ 18s. } 9\text{d.} = 779.25$

9880 (24 p.
 794

$\therefore$ Total amount expended = \$944.08
 $\therefore$ Deposit in bank = \$4171.50 - \$944.08 = \$3227.42.

852
 80 $\frac{1}{2}$

10648 (26 yds.
 794 $\frac{1}{2}$

2708
 2582

826
 0

2934 (7 $\frac{1}{4}$ ft.
 2779

155

PAPER III.

(1)

£ s. d.
203761) 9520782 14 6 (£46
815044

1370292

1222566

147726

20

2954534 (14s.

203761

916924

815044

101880

12

1222566 (6d.

1222566

(2)

Suppose 1 to represent the 1st
man's share,

$\therefore 1 + 3 + 5 = 9 = \text{No. of shares.}$

$\$63000 \div 9 = \$7000 = \text{value of}$
a share.

$\$7000 \times 1 = \7000

$\$7000 \times 3 = \21000

$\$7000 \times 5 = \35000

(3)

£ s. d.
20) 354 11 6 (£13

26

94

78

16

20

331 (12s.

812

19

12

234 (9d.

234

(4)
 ac. ro. per. yds.
 20) 10 2 7 2 (1 ro. 18 per. 5 yds. 2 ft.
 4

(5)
 tons. cwt. qrs.
 347) 300 15 3 (17 cwt.
 20

(6)
 20 mls. = 267200 in.
 2 ft. 6 in. = 30 in.
 $\therefore$ No. of steps taken =
 $267200 \div 30 = 42240$
 No. of minutes occupied in
 walking =
 $42240 \div 110 = 384$
 $\frac{1}{2}$ hr. = 30 minutes' rest.
 $\therefore 384 + 30 = 414$ min. =
 6 hrs. 54 min.

42
 29
 13
 40
 527 (18 per.)
 29
 237
 232
 5
 30 $\frac{1}{2}$
 152
 1 $\frac{1}{2}$
 153 $\frac{1}{2}$ (5 yds.)
 145
 8 $\frac{1}{2}$
 9
 74 $\frac{1}{2}$ (2 ft.)
 58
 16 $\frac{1}{2}$
 1344
 224
 3584 (10 oz.)
 347
 114
 16

684
 114
 1824 (5 drs.)
 1785
 89

PAPER IV.

(1)	(2)	(4)
£6 17s. 6d. = \$27.50	$8+3=11$	$4 \times 38 = 152$ doz.
£3 12s. 9d. = \$14.55	$8+11-1=18$	Owner net, 1 sh.
$\therefore$ sum = \$27.50 +		Owner boat, 2 shs.
\$30.27 + \$14.55 + \$75.83	(3)	Each man, 4 shs.
= \$148.15.	$54 \div 6 = 9$	Four men, 16 shs.
	$9 \times 1 = 9$	$\therefore$ total no. of shs.
(6)	$9 \times 2 = 18$	$= 1+2+16 = 19$
$84889 - 889 = 84000$	$9 \times 3 = 27$	$152+19=8$ doz. =
$84000 + 2 = 42000$		value of 1 share.
$42000 + 889 = 42889$		$8 \times 1 = 8$ dozs.
		$8 \times 2 = 16$ "
		$8 \times 4 = 32$ "

PAPER V.

(1)	(2)
72678397	$73697 \times 11689 = 861444233$
86073	$861444233 + 3687 = 861447920$
218035191	(3)
508748779	$27812 - 15908 = 11904$
436070382	(5)
581427176	22983
6255647664981	96801
(4)	64183
$89264 \div 7 = 12752$	91308
	190060
	465335
	(6)
	10240
	704
	8084
	4313
	72247
	95587

PAPER VI.

(1)	(2)
$160302 + 168795 = 329097$	\$6000000
$71973 + 24527 = 96500$	4866666
160302	1467750
329097	800000
71973	1909640
96500	590382
657872	862033
	\$16496471

(3)

\$7328146.68
 1888576.76
 621936.42
 417474.00
 66554.00
 122142.77

 \$10444830.63

(5)

ac.

635) 86895 (136 ac.
 635

2339

1905

4345

3810

535

4

2140 (3 ro.

1905

235

40

9400 (14 per.

635

3050 15427½ (24-17½ yds.

2540 1270

510

30½

2727½

2540

15300

127½

187½

635

375

1270

(4)

\$375, team,
 \$ 82, wagon,
 \$ 16, plough,
 \$ 16, stove,
 \$153, reaping machine,
 \$ 96, sheep,
 \$ 50, cows,
 \$ 18, pigs,
 \$ 60, wages.

Total expenditure = \$866,

\$975 - \$866 = \$109

\$109 ÷ \$1.75 = 62.28½

no. of hundred lbs.

62.28½ × 100 = 6228½ lbs.

(6)

mls. per. yds.
 10 3 4
 8

80

40

3203

5½

16019

1601½

17620½

3

52861½

12

634338

Ex. XXXII. (p. 71.)

$$\begin{array}{r} (1) \\ 8) 18(2 \\ \underline{16} \end{array}$$

$$\begin{array}{r} 2) 8(4 \\ \underline{8} \end{array}$$

∴ G. C. M. is 2

$$\begin{array}{r} (2) \\ 6) 15(2 \\ \underline{12} \end{array}$$

$$\begin{array}{r} 3) 6(2 \\ \underline{6} \end{array}$$

∴ G. C. M. is 3

$$\begin{array}{r} (3) \\ 4) 22(5 \\ \underline{20} \end{array}$$

$$\begin{array}{r} 2) 4(2 \\ \underline{4} \end{array}$$

∴ G. C. M. is 2

$$\begin{array}{r} (4) \\ 16) 28(1 \\ \underline{16} \end{array}$$

$$\begin{array}{r} 12) 16(1 \\ \underline{12} \end{array}$$

$$\begin{array}{r} 4) 12(3 \\ \underline{12} \end{array}$$

$$\begin{array}{r} (5) \\ 20) 32(1 \\ \underline{20} \end{array}$$

$$\begin{array}{r} 12) 20(1 \\ \underline{12} \end{array}$$

$$\begin{array}{r} 8) 12(1 \\ \underline{8} \end{array}$$

$$\begin{array}{r} 4) 8(2 \\ \underline{8} \end{array}$$

∴ G. C. M. is 4

$$\begin{array}{r} (6) \\ 24) 36(1 \\ \underline{24} \end{array}$$

$$\begin{array}{r} 15) 24(1 \\ \underline{15} \end{array}$$

$$\begin{array}{r} 9) 24(2 \\ \underline{18} \end{array}$$

$$\begin{array}{r} 6) 9(1 \\ \underline{6} \end{array}$$

$$\begin{array}{r} 3) 6(2 \\ \underline{6} \end{array}$$

∴ G. C. M. is 3

$$\begin{array}{r} (7) \\ 26) 44(1 \\ \underline{26} \end{array}$$

$$\begin{array}{r} 18) 26(1 \\ \underline{18} \end{array}$$

$$\begin{array}{r} 8) 18(2 \\ \underline{16} \end{array}$$

$$\begin{array}{r} 2) 8(4 \\ \underline{8} \end{array}$$

∴ G. C. M. is 2

$$\begin{array}{r} (8) \\ 30) 42(1 \\ \underline{30} \end{array}$$

$$\begin{array}{r} 12) 30(2 \\ \underline{24} \end{array}$$

$$\begin{array}{r} 6) 12(2 \\ \underline{12} \end{array}$$

∴ G. C. M. is 6

$$\begin{array}{r} (9) \\ 36) 56(1 \\ \underline{36} \end{array}$$

$$\begin{array}{r} 20) 36(1 \\ \underline{20} \end{array}$$

$$\begin{array}{r} 16) 20(1 \\ \underline{16} \end{array}$$

∴ G. C. M. is 4

$$\begin{array}{r} (10) \\ 40) 116(2 \\ \underline{92} \end{array}$$

$$\begin{array}{r} 24) 46(1 \\ \underline{24} \end{array}$$

$$\begin{array}{r} 22) 24(1 \\ \underline{22} \end{array}$$

∴ G. C. M. is 2

$$\begin{array}{r} (11) \\ 58) 174(3 \\ \underline{174} \end{array}$$

∴ G. C. M. is 3

$$\begin{array}{r} 4) 16(4 \\ \underline{16} \end{array}$$

$$\begin{array}{r} 2) 22(11 \\ \underline{22} \end{array}$$

$$\begin{array}{r} (12) \\ 315) 378 (1 \\ \underline{315} \end{array}$$

$$\begin{array}{r} 63) 315 (5 \\ \underline{315} \end{array}$$

$\therefore$ G. C. M. is 33

$$\begin{array}{r} (15) \\ 310) 630 (2 \\ \underline{620} \end{array}$$

$$\begin{array}{r} 10) 310 (31 \\ \underline{310} \end{array}$$

$\therefore$ G. C. M. is 10

$$\begin{array}{r} (17) \\ 127) 445 (4 \\ \underline{381} \end{array}$$

$$\begin{array}{r} 64) 127 (1 \\ \underline{64} \end{array}$$

$$\begin{array}{r} 63) 64 (1 \\ \underline{63} \end{array}$$

$$\begin{array}{r} 1) 63 (63 \\ \underline{63} \end{array}$$

$\therefore$ No G. C. M.

$$\begin{array}{r} (18) \\ 6408) 7264 (1 \\ \underline{6408} \end{array}$$

$$\begin{array}{r} 850) 6408 (7 \\ \underline{5992} \end{array}$$

$$\begin{array}{r} 416) 856 (2 \\ \underline{832} \end{array}$$

(Continued on next page.)

$$\begin{array}{r} (13) \\ 138) 366 (2 \\ \underline{256} \end{array}$$

$$\begin{array}{r} 110) 128 (1 \\ \underline{110} \end{array}$$

$$\begin{array}{r} 18) 110 (6 \\ \underline{108} \end{array}$$

$$\begin{array}{r} 2) 18 (9 \\ \underline{18} \end{array}$$

$\therefore$ G. C. M. is 2

$$\begin{array}{r} (16) \\ 424) 1216 (2 \\ \underline{848} \end{array}$$

$$\begin{array}{r} 368) 424 (1 \\ \underline{368} \end{array}$$

$$\begin{array}{r} 56) 368 (6 \\ \underline{336} \end{array}$$

$$\begin{array}{r} 32) 56 (1 \\ \underline{32} \end{array}$$

$$\begin{array}{r} 24) 32 (1 \\ \underline{24} \end{array}$$

$$\begin{array}{r} 8) 24 (3 \\ \underline{24} \end{array}$$

$\therefore$ G. C. M. is 8

$$\begin{array}{r} (19) \\ 3042) 3094 (1 \\ \underline{3042} \end{array}$$

$$\begin{array}{r} 52) 3042 (58 \\ \underline{260} \end{array}$$

(18 and 19 continued.)

(1

180 (6

180

L. is 30

24) 416 (17

24

176

168

442

416

26) 52 (2

52

8) 24 (3

24

∴ G. C. M. is 26

∴ G. C. M. is 8

(21)
1441) 1572 (1
1441(20)
7040) 7392 (1
7040(131) 1441 (11
131352) 7040 (20
7040131
131

∴ G. C. M. is 352

∴ G. C. M. is 131

(22)
23025) 46436 (2
46050(23)
21168) 204624 (9
190512386) 23025 (59
193014112) 21168 (1
141123725
34747056) 14112 (3
14112251) 386 (1
251

∴ G. C. M. is 7056

— 135) 251 (1
135
2) 18 (1
18116) 135 (1
1161) 2 (2
219) 116 (6
114

∴ No G. C. M.

$$\begin{array}{r} (24) \\ 20579 \overline{) 97482} \quad (3) \\ 88737 \end{array}$$

$$\begin{array}{r} 8745 \overline{) 29579} \quad (3) \\ 26235 \end{array}$$

$$\begin{array}{r} 8344 \overline{) 8745} \quad (2) \\ 6688 \end{array}$$

$$\begin{array}{r} 2057 \overline{) 8344} \quad (1) \\ 2057 \end{array}$$

$$\begin{array}{r} 1287 \overline{) 2057} \quad (1) \\ 1287 \end{array}$$

$$\begin{array}{r} 770 \overline{) 1287} \quad (1) \\ 770 \end{array}$$

$$\begin{array}{r} (25) \\ 738140 \overline{) 828597} \quad (1) \\ 738140 \end{array}$$

$$\begin{array}{r} 517 \overline{) 770} \quad (1) \\ 517 \end{array}$$

$$\begin{array}{r} 90457 \overline{) 738140} \quad (8) \\ 723656 \end{array}$$

$$\begin{array}{r} 258 \overline{) 517} \quad (2) \\ 506 \end{array}$$

$$\begin{array}{r} 14484 \overline{) 90457} \quad (6) \\ 86904 \end{array}$$

$$\begin{array}{r} 11 \overline{) 253} \quad (23) \\ 253 \end{array}$$

$$\begin{array}{r} 3553 \overline{) 14484} \quad (4) \\ 14212 \end{array}$$

$\therefore$ G. C. M. is 11

$$\begin{array}{r} 272 \overline{) 3553} \quad (13) \\ 272 \end{array}$$

$$\begin{array}{r} 833 \overline{) 272} \quad (16) \\ 17 \end{array}$$

$$\begin{array}{r} 102 \overline{) 102} \\ 102 \end{array}$$

$\therefore$ G. C. M. is 17

$$\begin{array}{r} (20) \\ 326337) 737800 \text{ (2)} \\ \underline{652674} \end{array}$$

$$\begin{array}{r} 85126) 326337 \text{ (3)} \\ \underline{255378} \end{array}$$

$$\begin{array}{r} 70959) 85126 \text{ (1)} \\ \underline{70959} \end{array}$$

$$\begin{array}{r} 14167) 70959 \text{ (5)} \\ \underline{70835} \end{array}$$

$$\begin{array}{r} 124) 14167 \text{ (114)} \\ \underline{124} \end{array}$$

$$\begin{array}{r} 176 \\ \underline{124} \end{array}$$

$$\begin{array}{r} 527 \\ \underline{496} \end{array}$$

$$\begin{array}{r} 31) 124 \text{ (4)} \\ \underline{124} \end{array}$$

$\therefore$ G. C. M. is 31

Ex. XXXIII. (p. 72.)

$$\begin{array}{r} (1) \\ 2 \mid 2, 4, 10 \\ \hline \end{array}$$

$$\begin{array}{r} 2, 5 \\ \therefore \text{L. C. M.} = 2 \times 2 \times 5 = 20 \end{array}$$

$$\begin{array}{r} (3) \\ 2 \mid 12, 16, 18 \\ \hline \end{array}$$

$$\begin{array}{r} 2 \mid 6, 8, 9 \\ \hline \end{array}$$

$$\begin{array}{r} 3 \mid 3, 4, 9 \\ \hline \end{array}$$

$$\begin{array}{r} 1, 4, 3 \\ \therefore \text{L. C. M.} = 2 \times 2 \times 5 \times 7 \times 9 = 1260 \end{array}$$

$$\therefore \text{L. C. M.} = 2 \times 2 \times 3 \times 4 \times 3 = 144$$

$$\begin{array}{r} (2) \\ 4 \mid 8, 9, 12 \\ \hline \end{array}$$

$$\begin{array}{r} 3 \mid 2, 9, 3 \\ \hline \end{array}$$

$$\begin{array}{r} 2, 3, 1 \\ \therefore \text{L. C. M.} = 4 \times 3 \times 2 \times 3 = 72 \end{array}$$

$$\begin{array}{r} (4) \\ 2 \mid 20, 28, 36 \\ \hline \end{array}$$

$$\begin{array}{r} 2 \mid 10, 14, 18 \\ \hline \end{array}$$

$$\begin{array}{r} 5, 7, 9 \end{array}$$

$$\begin{array}{r|l}
 & (5) \\
 2 & 16, 24, 30 \\
 \hline
 2 & 8, 12, 15 \\
 \hline
 2 & 4, 6, 15 \\
 \hline
 3 & 2, 3, 15 \\
 \hline
 & 2, 1, 5
 \end{array}$$

$$\therefore \text{L. C. M.} = 2 \times 2 \times 2 \times 3 \times 2 \times 5 = 240$$

$$\text{L. C. M.} = 2 \times 2 \times 2 \times 3 \times 7 = 168$$

$$\begin{array}{r|l}
 & (7) \\
 5 & 15, 25, 105 \\
 \hline
 & 5, 21
 \end{array}$$

$$\therefore \text{L. C. M.} = 5 \times 5 \times 21 = 525$$

$$\begin{array}{r|l}
 & (9) \\
 2 & 7, 21, 6, 14, 25 \\
 \hline
 3 & 21, 3, 7, 25
 \end{array}$$

$$\therefore \text{L. C. M.} = 2 \times 3 \times 7 \times 25 = 1050$$

$$\begin{array}{r|l}
 & (10) \\
 2 & 7, 8, 9, 10, 12 \\
 \hline
 2 & 7, 4, 9, 5, 6 \\
 \hline
 3 & 7, 2, 9, 5, 3
 \end{array}$$

$$\therefore \text{L. C. M.} = 7, 2, 3, 5,$$

$$2 \times 2 \times 7 \times 2 \times 3 \times 5 \times 3 = 2520$$

$$\therefore \text{L. C. M.} = 2 \times 2 \times 2 \times 3 \times 7 \times 3 \times 11 \times 2 = 11088$$

$$\begin{array}{r|l}
 & (12) \\
 5 & 2, 3, 45, 15, 25
 \end{array}$$

$$\therefore \text{L. M.} = 5 \times 2 \times 9 \times 5 = 450$$

$$\therefore \text{L. C. M.} = 3 \times 8 \times 5 \times 9 = 1080$$

$$\begin{array}{r|l}
 & (6) \\
 2 & 24, 56, 84 \\
 \hline
 2 & 12, 28, 42 \\
 \hline
 2 & 6, 14, 21 \\
 \hline
 3 & 3, 7, 21
 \end{array}$$

$$\begin{array}{r|l}
 & (8) \\
 2 & 6, 33, 24, 32 \\
 \hline
 2 & 33, 12, 16 \\
 \hline
 2 & 33, 6, 8 \\
 \hline
 3 & 33, 3, 4
 \end{array}$$

$$\therefore \text{L. C. M.} = 2 \times 2 \times 2 \times 3 \times 11 \times 4 = 1056$$

$$\begin{array}{r|l}
 & (11) \\
 2 & 24, 28, 36, 22, 16 \\
 \hline
 2 & 12, 14, 18, 11, 8 \\
 \hline
 2 & 6, 7, 9, 11, 4 \\
 \hline
 3 & 3, 7, 9, 11, 2
 \end{array}$$

$$7, 3, 11, 2$$

$$\begin{array}{r|l}
 & (13) \\
 3 & 9, 4, 8, 15, 27,
 \end{array}$$

$$8, 5, 9$$

$$\begin{array}{l|l}
 \begin{array}{l}
 \text{(14)} \\
 2 \mid 15, 20, 24, 21, 35 \ 2 \\
 2 \mid 15, 10, 12, 21, 35 \ 3 \\
 3 \mid 15, 5, 6, 21, 35 \\
 \hline
 5, 5, 2, 7, 35
 \end{array}
 &
 \begin{array}{l}
 \text{(15)} \\
 4, 5, 7, 8, 12, 21, 30 \\
 \hline
 4, 21, 15 \\
 \hline
 4, 7, 5 \\
 \hline
 \therefore \text{L. C. M.} = \\
 2 \times 3 \times 4 \times 7 \times 5 = 840
 \end{array}
 \end{array}$$

$$\therefore \text{L. C. M.} = 2 \times 2 \times 3 \times 2 \times 35 = 840$$

$$\begin{array}{l|l}
 \begin{array}{l}
 \text{(16)} \\
 3 \mid 2, 7, 9, 12, 15, 52, 63 \\
 \hline
 5, 52, 21 \ 11 \\
 \hline
 \therefore \text{L. C. M.} = 3 \times 5 \times 52 \times 21 = 16380
 \end{array}
 &
 \begin{array}{l}
 \text{(17)} \\
 3, 7, 21, 11, 77, 198 \\
 \hline
 7, 77, 66 \\
 \hline
 7, 6 \\
 \hline
 \therefore \text{L. C. M.} = 3 \times 11 \times 7 \times 6 = 1386
 \end{array}
 \end{array}$$

$$\begin{array}{l|l}
 \begin{array}{l}
 \text{(18)} \\
 2 \mid 100, 56, 35, 125, 150 \\
 2 \mid 50, 28, 125, 75 \\
 5 \mid 25, 14, 125, 75 \\
 5 \mid 14, 25, 15 \\
 \hline
 14, 5, 3 \\
 \hline
 \therefore \text{L. C. M.} = 2 \times 2 \times 5 \times 5 \times 14 \times 5 \times 3 = 21000
 \end{array}
 &
 \begin{array}{l}
 \text{(19)} \\
 22, 55, 19, 15, 95, 133 \\
 \hline
 22, 11, 3, 19, 133 \\
 \hline
 \therefore \text{L. C. M.} = \\
 5 \times 22 \times 3 \times 133 = 43890
 \end{array}
 \end{array}$$

$$\begin{array}{l|l}
 \begin{array}{l}
 \text{(20)} \\
 2 \mid 48, 64, 27, 33, 110, 165 \\
 2 \mid 24, 32, 27, 55, 165 \\
 2 \mid 12, 16, 27, 165 \\
 2 \mid 6, 8, 27, 165 \\
 3 \mid 3, 4, 27, 165 \\
 \hline
 4, 9, 55
 \end{array}
 &
 \end{array}$$

$$\therefore \text{L. C. M.} = 2 \times 2 \times 2 \times 2 \times 3 \times 4 \times 9 \times 55 = 95040$$

Ex. XXXVII. (p. 76.)

- (1) $\frac{4}{4} = 3$. (2) $\frac{4}{4} = 2\frac{1}{2}$. (3) $\frac{1}{2} = 4\frac{1}{2}$. (4) $\frac{1}{4} = 4$.
 (5) $\frac{1}{2} = 3\frac{1}{2}$ (6) $\frac{4}{4} = 6\frac{1}{2}$ (7) $\frac{4}{4} = 5\frac{1}{2}$ (8) $\frac{1}{4} = 6\frac{1}{2}$
 (9) $\frac{1}{4} = 7$ (10) $\frac{1}{4} = 8$ (11) $\frac{1}{2} = 8\frac{1}{2}$ (12) $\frac{1}{4} = 18\frac{1}{2}$
 (13) $\frac{1}{100} = 9\frac{1}{100}$ (14) $\frac{1}{2} = 102\frac{1}{2}$ (15) $\frac{1}{4} = 12\frac{1}{4}$

Ex. XXXVIII. (p. 76.)

- (1) $1\frac{1}{3} = \frac{1 \times 3 + 1}{3} = \frac{4}{3}$ (2) $2\frac{1}{2} = \frac{2 \times 12 + 1}{12} = \frac{25}{12}$
 (3) $1\frac{1}{5} = \frac{1 \times 15 + 1}{15} = \frac{16}{15}$ (4) $17\frac{1}{5} = \frac{17 \times 5 + 3}{5} = \frac{88}{5}$
 (5) $12\frac{1}{7} = \frac{12 \times 7 + 5}{7} = \frac{89}{7}$ (6) $203\frac{1}{19} = \frac{203 \times 19 + 17}{19} = \frac{3874}{19}$
 (7) $2\frac{1}{65} = \frac{2 \times 65 + 11}{65} = \frac{141}{65}$ (8) $29\frac{1}{8} = \frac{29 \times 8 + 7}{8} = \frac{239}{8}$
 (9) $704\frac{1}{126} = \frac{704 \times 126 + 12}{126} = \frac{88716}{126}$
 (10) $900\frac{1}{401} = \frac{900 \times 401 + 31}{401} = \frac{360931}{401}$
 (11) $5\frac{1}{680} = \frac{5 \times 680 + 7}{680} = \frac{3407}{680}$
 (12) $53\frac{1}{63} = \frac{53 \times 63 + 37}{63} = \frac{3376}{63}$
 (13) $21\frac{1}{1250} = \frac{21 \times 1250 + 3}{1250} = \frac{26253}{1250}$
 (14) $148\frac{1}{465} = \frac{148 \times 465 + 237}{465} = \frac{69057}{465}$
 (15) $13\frac{1}{2160} = \frac{13 \times 2160 + 1080}{2160} = \frac{29160}{2160}$
 (16) $25\frac{1}{2400} = \frac{25 \times 2400 + 389}{2400} = \frac{60389}{2400}$
 (17) $197\frac{1}{3084} = \frac{197 \times 3084 + 995}{3084} = \frac{608543}{3084}$

Ex. XXXIX. (p. 77.)

$$(1) \frac{4}{5} \text{ of } \frac{3}{4} = \frac{3 \times 4}{4 \times 5} = \frac{3}{5} \quad (2) \frac{4}{5} \text{ of } 1\frac{2}{3} = \frac{4 \times 10}{5 \times 12} = \frac{2}{3}$$

$$(3) \frac{3}{4} \text{ of } \frac{9}{10} = \frac{9}{10} \quad (4) \frac{2}{3} \text{ of } 1\frac{1}{2} = \frac{12}{55}$$

$$(5) \frac{5}{6} \text{ of } 2\frac{1}{8} = \frac{5}{6} \times \frac{21}{8} = \frac{35}{16} \quad (6) \frac{2}{3} \text{ of } 1\frac{1}{2} = \frac{2}{3} \times \frac{5}{4} = \frac{5}{6}$$

$$(7) 18\frac{1}{2} \text{ of } 5\frac{7}{8} \text{ of } 10 = \frac{164}{9} \times \frac{87}{16} \times \frac{10}{1} = \frac{5945}{6}$$

$$(8) 11\frac{1}{2} \text{ of } 8\frac{1}{2} = \frac{57}{5} \times \frac{59}{7} = \frac{3363}{35}$$

$$(9) \frac{5}{6} \text{ of } 2\frac{1}{2} \text{ of } 9 = \frac{5}{6} \times \frac{7}{3} \times \frac{9}{1} = \frac{35}{2}$$

$$(10) \frac{4}{7} \text{ of } 3\frac{1}{2} \text{ of } 2\frac{1}{2} = \frac{4}{7} \times \frac{15}{4} \times \frac{7}{2} = \frac{15}{2}$$

$$(11) \frac{5}{8} \text{ of } \frac{1}{11} \text{ of } 3\frac{1}{2} \text{ of } 1\frac{1}{2} = \frac{1}{36}$$

$$(12) \frac{1}{14} \text{ of } 4\frac{1}{2} \text{ of } \frac{1}{37} \text{ of } 6\frac{1}{11} \text{ of } \frac{1}{27} = \frac{8}{14} \times \frac{41}{9} \times \frac{6}{37} \times \frac{74}{11} \times \frac{7}{82}$$

$$= \frac{1}{11} \quad (13) \frac{1}{11} \text{ of } 2\frac{1}{2} \text{ of } \frac{1}{7} \text{ of } 10\frac{1}{2} = \frac{5}{11} \times \frac{5}{2} \times \frac{5}{7} \times \frac{21}{3} = \frac{375}{44}$$

$$(14) \frac{7}{9} \text{ of } 12\frac{1}{2} \text{ of } \frac{1}{2} \text{ of } \frac{5}{6} \text{ of } \frac{1}{8} \text{ of } 9 = \frac{7}{9} \times \frac{25}{2} \times \frac{4}{5} \times \frac{5}{6} \times \frac{3}{8} \times \frac{9}{1}$$

$$= \frac{175}{8} \quad (15) \frac{1}{18} \text{ of } \frac{7}{8} \text{ of } 1\frac{1}{10} \text{ of } \frac{3}{4} \text{ of } \frac{1}{10} \text{ of } 2 \text{ of } \frac{1}{27} =$$

$$\frac{5}{18} \times \frac{7}{8} \times \frac{36}{10} \times \frac{9}{4} \times \frac{3}{10} \times \frac{2}{1} \times \frac{8}{27} = \frac{14}{15}$$

(16) $\frac{5}{7}$ of $\frac{3}{8}$ of $\frac{6}{7}$ of $70\frac{3}{4}$ of $\frac{3}{40}$ of $1\frac{7}{11}$ of $147 =$

$$\frac{5}{7} \times \frac{3}{8} \times \frac{6}{7} \times \frac{632}{9} \times \frac{3}{40} \times \frac{18}{11} \times \frac{147}{1} = \frac{6399}{22}.$$

Ex XL. (p. 78.)

In each of the following examples we divide numerator and denominator by their G. C. M., or as we shall write it:

$$(1) \frac{2}{4} = \frac{2 \div 2}{4 \div 2} = \frac{1}{2}.$$

$$(2) \frac{10}{15} = \frac{10 \div 5}{15 \div 5} = \frac{2}{3}.$$

$$(3) \frac{14}{21} = \frac{14 \div 7}{21 \div 7} = \frac{2}{3}.$$

$$(4) \frac{30}{48} = \frac{30 \div 6}{48 \div 6} = \frac{5}{8}.$$

$$(5) \frac{28}{63} = \frac{28 \div 7}{63 \div 7} = \frac{4}{9}.$$

$$(6) \frac{64}{84} = \frac{64 \div 4}{84 \div 4} = \frac{16}{21}.$$

$$(7) \frac{77}{121} = \frac{77 \div 11}{121 \div 11} = \frac{7}{11}.$$

$$(8) \frac{48}{272} = \frac{48 \div 16}{272 \div 16} = \frac{3}{17}.$$

$$(9) \frac{1428}{2652} = \frac{1428 \div 204}{2652 \div 204} = \frac{7}{13}.$$

$$(10) \frac{1408}{1664} = \frac{1408 \div 128}{1664 \div 128} = \frac{11}{13}.$$

$$(11) \frac{875}{1000} = \frac{875 \div 125}{1000 \div 125} = \frac{7}{8}.$$

$$(12) \frac{1690}{2600} = \frac{1690 \div 130}{2600 \div 130} = \frac{13}{20}.$$

$$(13) \frac{837}{2268} = \frac{837 \div 27}{2268 \div 27} = \frac{31}{84}.$$

$$(14) \frac{6006}{8008} = \frac{6006 \div 2002}{8008 \div 2002} = \frac{3}{4}.$$

$$(15) \frac{805}{2622} = \frac{805 \div 23}{2622 \div 23} = \frac{35}{114}.$$

$$(16) \frac{9504}{10692} = \frac{9504 \div 1188}{10692 \div 1188} = \frac{8}{9}.$$

$$(17) \frac{28111}{38759} = \frac{28111 \div 121}{38759 \div 121} = \frac{191}{270}.$$

$$(18) \frac{30590+37}{271469+37} = \frac{837}{7337}$$

$$(19) \frac{5170+22}{8734+22} = \frac{235}{397}$$

$$(20) \frac{1236+12}{1632+12} = \frac{103}{136}$$

$$(21) \frac{285714+142857}{999999+142857} = \frac{2}{7}$$

$$(22) \frac{10395+11}{16819+11} = \frac{945}{1529}$$

$$(23) \frac{7040+352}{7392+352} = \frac{20}{21}$$

$$(24) \frac{11385+495}{16335+495} = \frac{23}{33}$$

Ex. XLI. (p. 79.)

(1) $\frac{3}{4}, \frac{5}{6}$. 12 is L. C. M. of denominators;

$\therefore$ fractions become $\frac{3 \times 3}{4 \times 3}, \frac{5 \times 2}{6 \times 2}$ or $\frac{9}{12}, \frac{10}{12}$.

(2) $\frac{1}{2}, \frac{3}{4}$. 12 is L. C. M. of denominators;

$\therefore$ fractions become $\frac{3 \times 3}{4 \times 3}, \frac{2 \times 4}{3 \times 4}$ or $\frac{9}{12}, \frac{8}{12}$.

(3) $\frac{3}{4}, \frac{7}{8}$. 8 is L. C. M. of denominators;

$\therefore$ fractions become $\frac{3 \times 2}{4 \times 2}, \frac{7 \times 1}{8 \times 1}$ or $\frac{6}{8}, \frac{7}{8}$.

(4) $\frac{3}{7}, \frac{5}{9}$. 63 is L. C. M. of denominators;

$\therefore$ fractions become $\frac{3 \times 9}{7 \times 9}, \frac{5 \times 7}{9 \times 7}$ or $\frac{27}{63}, \frac{35}{63}$.

(5) $\frac{11}{16}, \frac{3}{24}$. 48 is L. C. M. of denominators;

$\therefore$ fractions become $\frac{11 \times 3}{16 \times 3}, \frac{21 \times 2}{24 \times 2}$ or $\frac{33}{48}, \frac{42}{48}$.

(6) $\frac{11}{12}$, $\frac{27}{40}$. 120 is L. C. M. of denominators;

$\therefore$ fractions become $\frac{11 \times 10}{12 \times 10}$, $\frac{27 \times 3}{40 \times 3}$ or $\frac{110}{120}$, $\frac{81}{120}$

(7) $\frac{7}{10}$, $\frac{183}{200}$. 200 is L. C. M. of denominators;

$\therefore$ fractions become $\frac{7 \times 20}{10 \times 20}$, $\frac{183 \times 1}{200 \times 1}$ or $\frac{140}{200}$, $\frac{183}{200}$

(8) $\frac{113}{280}$, $\frac{527}{960}$. 6720 is L. C. M. of denominators;

$\therefore$ fractions become $\frac{113 \times 24}{280 \times 24}$, $\frac{527 \times 7}{960 \times 7}$ or $\frac{2712}{6720}$, $\frac{3689}{6720}$

(9) $\frac{4}{5}$, $\frac{11}{12}$. 60 is L. C. M. of denominators;

$\therefore$ fractions become $\frac{4 \times 12}{5 \times 12}$, $\frac{11 \times 5}{12 \times 5}$ or $\frac{48}{60}$, $\frac{55}{60}$

(10) $\frac{3}{16}$, $\frac{8}{21}$, $\frac{5}{9}$. 1008 is L. C. M. of den^{rs}.; $\therefore$ fractions

become $\frac{3 \times 63}{16 \times 63}$, $\frac{8 \times 48}{21 \times 48}$, $\frac{5 \times 112}{9 \times 112}$ or $\frac{189}{1008}$, $\frac{384}{1008}$, $\frac{560}{1008}$

(11) $\frac{7}{15}$, $\frac{11}{21}$, $\frac{23}{30}$. 210 is L. C. M. of den^{rs}.; $\therefore$ fractions

become $\frac{7 \times 14}{15 \times 14}$, $\frac{11 \times 10}{21 \times 10}$, $\frac{23 \times 7}{30 \times 7}$ or $\frac{98}{210}$, $\frac{110}{210}$, $\frac{161}{210}$

(12) $\frac{7}{9}$, $\frac{8}{11}$, $\frac{13}{15}$, $\frac{9}{17}$. 8415 is L. C. M. of den^{rs}.; $\therefore$ fract^{ns}.

become $\frac{7 \times 935}{9 \times 935}$, $\frac{8 \times 765}{11 \times 765}$, $\frac{13 \times 561}{15 \times 561}$, $\frac{9 \times 495}{17 \times 495}$ or $\frac{6545}{8415}$
 $\frac{6120}{8415}$, $\frac{7293}{8415}$, $\frac{4455}{8415}$

(13) $\frac{13}{14}$, $\frac{35}{36}$, $\frac{14}{15}$, $\frac{40}{63}$. 1260 is L. C. M. of den^{rs}.; $\therefore$ fract^{ns}.

become $\frac{13 \times 90}{14 \times 90}$, $\frac{35 \times 35}{36 \times 35}$, $\frac{14 \times 84}{15 \times 84}$, $\frac{40 \times 20}{63 \times 20}$ or $\frac{1170}{1260}$
 $\frac{1225}{1260}$, $\frac{1176}{1260}$, $\frac{800}{1260}$

(14) $\frac{7}{12}$, $\frac{17}{30}$, $\frac{13}{18}$, $\frac{15}{20}$, $\frac{9}{10}$. 180 is L. C. M. of denominators;

$\therefore$ fractions become $\frac{7 \times 15}{12 \times 15}$, $\frac{17 \times 6}{30 \times 6}$, $\frac{13 \times 10}{18 \times 10}$, $\frac{15 \times 9}{20 \times 9}$

$$\frac{7 \times 12}{15 \times 12} \text{ or } \frac{105}{180}, \frac{102}{180}, \frac{120}{180}, \frac{135}{180}, \frac{84}{180}$$

(15) $\frac{1}{4}, \frac{3}{8}, \frac{1}{2}, \frac{1}{5}$. 7200 is L. C. M. of den^{rs}.; $\therefore$ fract^{ns}.

$$\begin{aligned} \text{become } & \frac{13 \times 288}{25 \times 288}, \frac{27 \times 225}{32 \times 225}, \frac{7 \times 600}{12 \times 600}, \frac{15 \times 400}{18 \times 400} \\ \text{or } & \frac{3744}{7200}, \frac{6075}{7200}, \frac{4200}{7200}, \frac{6000}{7200} \end{aligned}$$

(16) $\frac{9}{14}, \frac{1}{4}, \frac{7}{29}, \frac{1}{3}, \frac{2}{3}, \frac{5}{23}$. 621180 is L. C. M. of den^{rs}.;

$$\begin{aligned} \therefore \text{fractions become } & \frac{9 \times 44370}{14 \times 44370}, \frac{13 \times 34510}{18 \times 34510}, \frac{7 \times 21420}{29 \times 21420}, \\ & \frac{18 \times 17748}{35 \times 17748}, \frac{23 \times 14790}{42 \times 14790}, \frac{53 \times 9135}{68 \times 9135} \text{ or } \frac{399330}{621180}, \frac{448630}{621180}, \\ & \frac{149940}{621180}, \frac{319464}{621180}, \frac{340170}{621180}, \frac{484155}{621180} \end{aligned}$$

(17) $\frac{2}{3}, \frac{4}{5}, \frac{3}{8}, \frac{1}{4}$. 120 is L. C. M. of den^{rs}.; $\therefore$ fractions

$$\begin{aligned} \text{become } & \frac{2 \times 40}{3 \times 40}, \frac{4 \times 24}{5 \times 24}, \frac{3 \times 15}{8 \times 15}, \frac{14 \times 8}{15 \times 8} \text{ or } \frac{80}{120}, \frac{96}{120}, \\ & \frac{45}{120}, \frac{112}{120} \end{aligned}$$

(18) $\frac{1}{4}, \frac{5}{6}, \frac{7}{8}, \frac{9}{10}$. 120 is L. C. M. of den^{rs}.; $\therefore$ fractions

$$\begin{aligned} \text{become } & \frac{3 \times 30}{4 \times 30}, \frac{5 \times 20}{6 \times 20}, \frac{7 \times 15}{8 \times 15}, \frac{9 \times 12}{10 \times 12} \text{ or } \frac{90}{120}, \frac{100}{120}, \\ & \frac{105}{120}, \frac{108}{120} \end{aligned}$$

(19) $\frac{1}{3}, \frac{5}{6}, \frac{7}{8}, \frac{5}{9}, \frac{1}{12}$. 72 is L. C. M. of den^{rs}.; $\therefore$ fractions

$$\begin{aligned} \text{become } & \frac{2 \times 24}{3 \times 24}, \frac{5 \times 12}{6 \times 12}, \frac{7 \times 9}{8 \times 9}, \frac{5 \times 8}{9 \times 8}, \frac{8 \times 6}{12 \times 6}, \\ \text{or } & \frac{48}{72}, \frac{60}{72}, \frac{63}{72}, \frac{40}{72}, \frac{48}{72} \end{aligned}$$

(20) $\frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \frac{1}{5}$; 330 is L. C. M. of den^{rs}.; $\therefore$ fractions

$$\begin{array}{l} \text{become } \frac{2 \times 110}{3 \times 100'} \quad \frac{4 \times 66}{5 \times 66'} \quad \frac{1 \times 165}{2 \times 165'} \quad \frac{3 \times 30}{11 \times 30'} \text{ or} \\ \frac{220}{330'} \quad \frac{264}{330'} \quad \frac{165}{330'} \quad \frac{90}{330'} \end{array}$$

Ex. XLII. (p. 80.)

(1) $\frac{1}{3}, \frac{1}{5}$; 15 is L. C. M. of den^{rs}.; $\therefore$ fractions become

$$\frac{2 \times 5}{3 \times 5'} \quad \frac{4 \times 3}{5 \times 3'} \text{ or } \frac{10}{15'} \quad \frac{12}{15'}$$

$\therefore$ in order of magnitude the fractions stand thus, $\frac{1}{3}, \frac{1}{5}$.

(2) $\frac{1}{3}, \frac{2}{5}$; 36 is L. C. M. of den^{rs}.; $\therefore$ fractions become

$$\frac{7 \times 4}{9 \times 4'} \quad \frac{9 \times 3}{12 \times 3'} \text{ or } \frac{28}{36'} \quad \frac{27}{36'}$$

$\therefore$ in order of magnitude the fractions stand thus, $\frac{1}{3}, \frac{2}{5}$.

(3) $\frac{1}{4}, \frac{1}{3}$; 312 is L. C. M. of den^{rs}.; $\therefore$ fract^{ns}. become

$$\frac{17 \times 13}{24 \times 13'} \quad \frac{19 \times 12}{26 \times 12'} \text{ or } \frac{221}{312'} \quad \frac{228}{312'}$$

$\therefore$ in order of magnitude the fractions stand thus, $\frac{1}{4}, \frac{1}{3}$.

(4) $\frac{1}{3}, \frac{1}{4}, \frac{1}{5}$; 504 is L. C. M. of den^{rs}.; $\therefore$ fract^{ns}. become

$$\frac{7 \times 56}{9 \times 56'} \quad \frac{5 \times 63}{8 \times 63'} \quad \frac{11 \times 36}{14 \times 36'} \text{ or } \frac{392}{504'} \quad \frac{315}{504'} \quad \frac{396}{504'}$$

$\therefore$ in order of magnitude the fractions stand thus, $\frac{1}{4}, \frac{1}{3}, \frac{1}{5}$.

(5) $\frac{1}{4}, \frac{1}{3}, \frac{1}{5}$; 882 is L. C. M. of den^{rs}.; $\therefore$ fract^{ns}. become

$$\frac{15 \times 21}{42 \times 21'} \quad \frac{22 \times 18}{49 \times 18'} \quad \frac{48 \times 14}{63 \times 14'} \text{ or } \frac{315}{882'} \quad \frac{396}{882'} \quad \frac{672}{882'}$$

$\therefore$ in order of magnitude the fract^{ns}. stand thus, $\frac{1}{4}, \frac{1}{3}, \frac{1}{5}$.

(6) $\frac{1}{4}, \frac{1}{3}, \frac{1}{5}$; 5040 is L. C. M. of den^{rs}.; $\therefore$ fract^{ns}. become

$$\frac{53 \times 63}{80 \times 63'} \quad \frac{63 \times 56}{90 \times 56'} \quad \frac{57 \times 60}{84 \times 60'} \text{ or } \frac{3339}{5040'} \quad \frac{3528}{5040'} \quad \frac{3420}{5040'}$$

$\therefore$ in order of magnitude the fract^{ns}. stand thus, $\frac{1}{4}, \frac{1}{3}, \frac{1}{5}$.

(7) $\frac{1}{2}$ of $\frac{2}{3} = \frac{1}{3}$; $\frac{1}{3}$ of $\frac{2}{3} = \frac{2}{9}$; $\frac{2}{3} = \frac{4}{6}$; 168 is L. C. M. of denominators; $\therefore$ fractions become

$\frac{5 \times 8}{21 \times 8}$ $\frac{3 \times 12}{14 \times 12}$ $\frac{59 \times 21}{8 \times 21}$ or $\frac{40}{168}$ $\frac{36}{168}$ $\frac{1239}{168}$ $\therefore$ in order of magnitude the fractions stand thus, $\frac{2}{3}$, $\frac{1}{2}$ of $\frac{2}{3}$, $\frac{1}{3}$ of $\frac{2}{3}$.

(8) $\frac{1}{12}$, $\frac{1}{16}$, $\frac{1}{18}$, $\frac{1}{24}$; 300 is L. C. M. of den^{rs}; $\therefore$ fract^{ns}.

become $\frac{11 \times 20}{15 \times 20}$ $\frac{17 \times 15}{20 \times 15}$ $\frac{21 \times 12}{25 \times 12}$ $\frac{29 \times 10}{30 \times 10}$ or $\frac{220}{300}$

$\frac{255}{300}$ $\frac{252}{300}$ $\frac{290}{300}$ $\therefore$ in order of magnitude the fractions stand thus, $\frac{1}{16}$, $\frac{1}{18}$, $\frac{1}{12}$, $\frac{1}{24}$.

(9) $\frac{1}{12}$ of $\frac{1}{18}$ of $\frac{7}{12} = \frac{7}{216}$; $\frac{4}{9}$ of $\frac{2}{3} = \frac{8}{27}$; $\frac{1}{8}$ of $\frac{7}{12}$ of 11 = $\frac{77}{96}$; $\frac{2}{3}$ of $\frac{4}{9}$ of $\frac{14}{12} = \frac{154}{27}$; 6336 is L. C. M. of denominators; $\therefore$ fractions become

$\frac{29 \times 576}{11 \times 576}$ $\frac{3 \times 576}{11 \times 576}$ $\frac{55 \times 99}{64 \times 99}$ $\frac{1610 \times 64}{99 \times 74}$ or $\frac{16704}{6336}$ $\frac{1728}{6336}$ $\frac{5445}{6336}$

$\frac{103040}{6336}$ $\therefore$ in order of magnitude the fract^{ns} stand thus,

$\frac{2}{3}$ of $\frac{4}{9}$, of $\frac{1}{8}$ of $\frac{14}{12}$, $\frac{1}{12}$ of $\frac{1}{18}$ $\frac{7}{12}$, $\frac{1}{8}$ of $\frac{7}{12}$ of 11, $\frac{4}{9}$ of $\frac{2}{3}$.

(10) $\frac{4}{18}$ of $\frac{1}{12} = \frac{1}{9}$; $\frac{1}{4}$ of $\frac{6}{12}$ of $\frac{1}{12}$ of $\frac{1}{12} = \frac{1}{144}$; $\frac{1}{12}$ of $\frac{1}{12}$ of $\frac{5}{12}$ of $\frac{1}{12}$ of $\frac{1}{12} = \frac{1}{1728}$; 63 is L. C. M. of denominators;

$\therefore$ fractions become $\frac{4 \times 7}{9 \times 7}$ $\frac{11 \times 9}{7 \times 9}$ $\frac{20 \times 21}{3 \times 21}$ or $\frac{28}{63}$ $\frac{99}{63}$

$\frac{420}{63}$ $\therefore$ in order of magnitude the fractions $\frac{1}{12}$ of $\frac{1}{12}$ of $\frac{5}{12}$ of $\frac{1}{12}$ of $\frac{1}{12}$, $\frac{1}{4}$ of $\frac{6}{12}$ of $\frac{1}{12}$ of $\frac{1}{12}$, $\frac{4}{18}$ of $\frac{1}{12}$.

(11) $\frac{1}{4}$, $\frac{2}{3}$; 35 is L. C. M. of den^{rs}; $\therefore$ fractions become

$\frac{5 \times 5}{7 \times 5}$ $\frac{3 \times 7}{5 \times 7}$ or $\frac{25}{35}$ $\frac{21}{35}$ $\frac{25}{35}$ $\frac{21}{35} = \frac{4}{35}$

$\therefore \frac{1}{4}$ of a yard is greater by $\frac{1}{35}$ of a yard.

(12) $\frac{1}{2}$, $\frac{1}{3}$; 6 is L. C. M. of den^{rs}.; $\therefore$ fractions become

$$\frac{1 \times 3}{2 \times 3}, \frac{2 \times 2}{3 \times 2} \text{ or } \frac{3}{6}, \frac{4}{6}, \frac{4}{6}, \frac{3}{6} = \frac{1}{6}$$

$\therefore \frac{1}{2}$ of a yard is the greater by $\frac{1}{6}$ of a yard.

(13) $1\frac{1}{2}$ of $\frac{1}{11}$ of $1\frac{1}{2}$ of $\frac{2}{3} = \frac{5}{2}$; $\frac{1}{6}$ of $1\frac{1}{10}$ of $5\frac{1}{4} = \frac{1}{4}$; 24 is L. C. M. of denominators; $\therefore$ fractions become

$$\frac{5 \times 2}{12 \times 2}, \frac{7 \times 1}{24 \times 1} \text{ or } \frac{10}{24}, \frac{7}{24}, \frac{10}{24}, \frac{7}{24} = \frac{3}{24}$$

$\therefore 1\frac{1}{2}$ of $\frac{1}{11}$ of $1\frac{1}{2}$ of $\frac{2}{3}$ is the greater by $\frac{3}{24}$ of a loaf.

Ex. XLIII. (p. 82.)

$$(1) \frac{1}{2} + \frac{1}{3} = \frac{7+6}{21} = \frac{13}{21} \quad (2) \frac{1}{2} + \frac{1}{3} = \frac{9+8}{12} = \frac{17}{12} = 1 \frac{5}{12}$$

$$(3) 3 + \frac{1}{2} = 3\frac{1}{2} \quad (4) \frac{1}{2} + \frac{1}{3} = \frac{9+10}{12} = \frac{19}{12} = 1 \frac{7}{12}$$

$$(5) \frac{1}{12} + \frac{1}{15} = \frac{25+28}{60} = \frac{53}{60}$$

$$(6) \frac{1}{2} + \frac{1}{12} = \frac{9+7}{12} = \frac{16}{12} = 1 \frac{4}{12} = 1 \frac{1}{3}$$

$$(7) \frac{3}{5} + \frac{1}{11} = \frac{33+25}{55} = \frac{58}{55} = 1 \frac{3}{55}$$

$$(8) \frac{1}{2} + \frac{1}{14} = \frac{21+20}{56} = \frac{41}{56} \quad (9) \frac{1}{10} + \frac{1}{5} = \frac{33+4}{90} = \frac{37}{90}$$

$$(10) 1\frac{1}{2} + 1\frac{1}{3} = \frac{4}{3} + \frac{7}{6} = \frac{8+7}{6} = \frac{15}{6} = 2\frac{3}{6} = 2\frac{1}{2}$$

$$(11) 7\frac{3}{5} + 8 = 7 + 8 + \frac{3}{5} = 15\frac{3}{5} = 15\frac{1}{2}$$

$$(12) 1\frac{1}{2} \text{ of } 2\frac{1}{2} = \frac{4}{8} \text{ of } \frac{5}{2} = \frac{10}{8} = 3\frac{1}{8}; \quad 3\frac{1}{8} + 6\frac{1}{4} = 8 + 6 + \frac{1}{8} + \frac{1}{4} = 9 + \frac{4+3}{12} = 9\frac{7}{12}.$$

$$(13) \frac{4}{5} + \frac{4}{5} + \frac{7}{5} = \frac{45+48+35}{60} = \frac{128}{60} = 2\frac{8}{60} = 2\frac{2}{15}.$$

$$(14) 2\frac{2}{3} + \frac{1}{3} + 3\frac{1}{2} = 2 + 3 + \frac{3}{8} + \frac{5}{18} + \frac{1}{12} = 5 + \frac{27+20+6}{72} = 5 + \frac{53}{72} = 5\frac{53}{72}.$$

$$(15) \frac{1}{3} \text{ of } 1\frac{1}{2} = \frac{1}{3} \text{ of } \frac{10}{7} = \frac{10}{21}; \quad 6\frac{3}{14} + \frac{10}{21} + 2\frac{7}{9} = 6 + 2 + \frac{3}{14} + \frac{10}{21} + \frac{7}{9} = 8 + \frac{27+60+98}{126} = 8 + \frac{185}{126} = 9\frac{59}{126}.$$

$$(16) 9\frac{1}{2} \text{ of } 2\frac{1}{3} = \frac{19}{2} \times \frac{7}{3} = \frac{133}{6} = 22\frac{1}{6}; \quad 22\frac{1}{6} + \frac{13}{18} + \frac{1}{27} = 22 + \frac{1}{6} + \frac{13}{18} + \frac{1}{27} = 22 + \frac{9+39+2}{54} = 22 + \frac{50}{54} = 22\frac{25}{27}.$$

$$(17) \frac{1}{3} \text{ of } (1 + 1\frac{1}{2}) = \frac{1}{3} \text{ of } 2\frac{1}{2} = \frac{1}{3} \text{ of } \frac{7}{3} = \frac{7}{9}; \quad \frac{7}{9} + \frac{2}{3} + \frac{5}{9} = \frac{12+15+14}{18} = \frac{41}{18} = 2\frac{5}{18}.$$

$$(18) \frac{1}{2} + \frac{2}{3} + \frac{3}{4} + \frac{1}{5} = \frac{30+40+45+48}{60} = \frac{163}{60} = 2\frac{43}{60}.$$

$$(19) 2\frac{1}{2} + 3\frac{1}{3} + 4\frac{1}{4} + 5\frac{1}{5} = 2 + 3 + 4 + 5 + \frac{1}{2} + \frac{1}{3} + \frac{1}{4} + \frac{1}{5} = 14 + \frac{30+20+15+12}{60} = 14 + \frac{77}{60} = 14 + 1\frac{17}{60} = 15\frac{17}{60}.$$

$$\begin{aligned}
 (20) \quad 5\frac{7}{24} + 13\frac{5}{32} + 4\frac{49}{72} + 2\frac{23}{60} &= 5 + 13 + 2 + \frac{7}{24} + \frac{5}{32} + \frac{49}{72} + \frac{23}{60} \\
 &= 20 + \frac{1680 + 1200 + 8920 + 2208}{5760} = 20 + \frac{8708}{5760} = 20 + 1 + \frac{2948}{5760} \\
 &= 20 + 1\frac{737}{1440} = 21\frac{737}{1440}
 \end{aligned}$$

$$\begin{aligned}
 (21) \quad 4\frac{5}{9} + 7\frac{7}{15} + 16\frac{9}{20} + 25\frac{13}{25} &= 4 + 16 + 25 + \frac{5}{9} + \frac{7}{15} + \frac{9}{20} + \frac{13}{25} \\
 &= 45 + \frac{500 + 420 + 405 + 468}{900} = 45 + \frac{1793}{900} = 45 + 1\frac{893}{900} \\
 &= 46\frac{893}{900}
 \end{aligned}$$

$$\begin{aligned}
 (22) \quad \frac{2}{3} \text{ of } 3\frac{1}{2} &= \frac{2}{3} \text{ of } 1\frac{1}{2} = \frac{2}{3} = 1\frac{1}{3}; \quad 3\frac{8}{9} + 16\frac{7}{9} + 7\frac{5}{9} + 1\frac{1}{3} = 8 \\
 &+ 16 + 7 + 1 + \frac{64 + 63 + 30 + 36}{72} = 27 + \frac{193}{72} = 27 + 2\frac{49}{72} \\
 &= 29\frac{49}{72}
 \end{aligned}$$

$$\begin{aligned}
 (23) \quad (2\frac{1}{2} + 3\frac{2}{3}) \text{ of } 2\frac{5}{11} + 3\frac{1}{5} \text{ of } (16\frac{5}{8} + 3\frac{1}{4}) + 1\frac{1}{3} \text{ of } 11 \text{ of } 2\frac{1}{12} &= \\
 (2 + 3 + \frac{3}{4} + \frac{2}{3}) \text{ of } \frac{27}{11} + \frac{16}{5} \text{ of } (16 + 8 + \frac{5}{8} + \frac{1}{4}) + \frac{5}{3} \text{ of } (11 & \\
 \text{of } \frac{45}{22}) &= (5 + \frac{9+8}{12}) \text{ of } \frac{27}{11} + \frac{16}{5} \text{ of } (19 + \frac{5+2}{8}) + \frac{75}{2} = \\
 6\frac{5}{12} \text{ of } \frac{27}{11} + \frac{16}{5} \text{ of } 19\frac{7}{8} + \frac{75}{2} &= \frac{77}{12} \text{ of } \frac{27}{11} + \frac{16}{5} \text{ of } \frac{159}{8} + \frac{75}{2} \\
 &= \frac{63}{4} + \frac{318}{5} + \frac{75}{2} = 15\frac{3}{4} + 63\frac{3}{5} + 37\frac{1}{2} = 15 + 63 + 37 + \frac{3}{4} + \\
 \frac{3}{5} + \frac{1}{2} &= 115 + \frac{15+12+10}{20} = 115 + \frac{37}{20} = 115 + 1\frac{17}{20} = \\
 &116\frac{17}{20}
 \end{aligned}$$

$$(14) \quad \pounds 2\frac{13}{18} + \pounds \frac{19}{24} + \pounds 3\frac{1}{12} + \pounds 4\frac{13}{16} + \pounds \frac{20}{48} = \pounds 2 + \pounds 3 + \pounds 4 +$$

$$\pounds \frac{13}{18} + \pounds \frac{19}{24} + \pounds \frac{1}{12} + \pounds \frac{13}{16} + \pounds \frac{20}{48} = \pounds 9 +$$

$$\pounds \frac{104+114+12+117+60}{144} = \pounds 2\frac{119}{144} + \pounds 9 = \pounds 11\frac{119}{144}$$

$$(25) \quad \frac{3}{10} \text{ of 4 lbs.} + \frac{5}{12} \text{ of 4 lbs.} + \frac{7}{15} \text{ of 4 lbs.} + \frac{9}{20} \text{ of 4 lbs.} +$$

$$\frac{14}{27} \text{ of 4 lbs.} + \frac{11}{15} = 1\frac{1}{5} \text{ lbs.} + 1\frac{2}{3} \text{ lbs.} + 1\frac{13}{15} \text{ lbs.} + 1\frac{4}{5} \text{ lbs.}$$

$$+ 2\frac{2}{27} \text{ lbs.} + \frac{11}{15} \text{ lbs.} = \left(1+1+1+1+2+4 + \frac{1}{5} + \frac{2}{3} + \frac{13}{15} + \frac{4}{5} \right.$$

$$\left. + \frac{2}{27} + \frac{11}{15} \right) \text{ lbs.} = 10 \text{ lbs.} + \frac{2^2 + 90 + 117 + 108 + 10 + 99}{135} \text{ lbs.}$$

$$= 10 \text{ lbs.} + \frac{451}{135} \text{ lbs.} = 10 \text{ lbs.} + 3\frac{46}{135} \text{ lbs.} = 13\frac{46}{135} \text{ lbs.}$$

Ex. XLIV. (p. 83.)

$$(1) \quad \frac{1}{2} - \frac{1}{4} = \frac{5-4}{20} = \frac{1}{20} \quad (2) \quad \frac{1}{2} - \frac{1}{8} = \frac{4-1}{8} = \frac{3}{8}$$

$$(3) \quad \frac{1}{4} - \frac{5}{12} = \frac{9-5}{12} = \frac{4}{12} = \frac{1}{3} \quad (4) \quad \frac{1}{2} - \frac{11}{12} = \frac{57-52}{72} = \frac{5}{72}$$

$$(5) \quad 3\frac{1}{2} - 2\frac{1}{6} = 3 - \frac{4-1}{6} = 1 + \frac{3}{6} = 1\frac{1}{2}$$

$$(6) \quad 7 - 2\frac{9}{10} = 7 - 2 + \frac{10-9}{10} = 4 + \frac{1}{10} = 4\frac{1}{10}$$

$$(7) 10\frac{1}{4} - 8\frac{1}{2} = 10\frac{13}{12} - 9\frac{1}{2} = 1 + \left(\frac{13}{12} - \frac{1}{2}\right) = 1 + \frac{30-4}{36} = 1\frac{35}{36}$$

$$(8) 17\frac{1}{4} - 13\frac{1}{2} = 17\frac{7}{4} - 14\frac{5}{6} = 3 + \left(\frac{7}{4} - \frac{5}{6}\right) = 3 + \frac{21-10}{12} = 3\frac{11}{12}$$

$$(9) 1\frac{1}{8} - \frac{1}{4} = 1\frac{29}{25} - 1\frac{3}{4} = \frac{116-75}{100} = \frac{41}{100}$$

$$(10) 4\frac{1}{7} - 2\frac{1}{2} = 4\frac{10}{7} - 3\frac{17}{20} = 1 + \frac{200-119}{140} = 1 + \frac{81}{140} = 1\frac{81}{140}$$

$$(11) 15\frac{1}{7} - 7\frac{1}{3} = 15\frac{10}{7} - 8\frac{2}{3} = 7 + \frac{30-14}{21} = 7 + \frac{16}{21} = 7\frac{16}{21}$$

$$(12) 20\frac{1}{8} - 8\frac{3}{5} = 20\frac{23}{18} - 9\frac{3}{56} = 11 + \frac{644-27}{504} = 11 + \frac{617}{504} = 11 + 1\frac{113}{504} = 12\frac{113}{504}$$

$$(13) 1 - \frac{3}{5} = \frac{5-3}{5} = \frac{2}{5}; \quad \frac{3}{5} - \frac{2}{5} = \frac{1}{5}$$

$$(14) (1) \frac{13}{12} - \frac{7}{36} = \frac{39-7}{36} = \frac{32}{36} = \frac{8}{9}$$

$$(2) 8\frac{1}{2} - 2\frac{4}{5} = 8\frac{3}{2} - 3\frac{4}{5} = 5 + \frac{3}{2} - \frac{4}{5} = 5 + \frac{15-8}{10} = 5\frac{7}{10}$$

$$(15) \frac{5}{8} \text{ d.} - \frac{5}{9} \text{ d.} = \frac{45-40}{72} \text{ d.} = \frac{5}{72} \text{ d.}$$

Ex. XLV. (p. 84.)

$$(1) \frac{1}{6} + 2\frac{1}{2} : 3\frac{1}{2} = 2 + 13 - 3 + \frac{1}{6} + \frac{1}{7} + \frac{3}{10} - \frac{3}{70} = 12$$

$$+ \frac{35 + 20 + 63 - 9}{210} = 12 + \frac{119}{210} = 12\frac{119}{210}$$

$$(2) \frac{1}{2} - \frac{1}{3} + \frac{1}{6} - \frac{1}{12} = \frac{6 - 9 + 20 - 13}{24} = \frac{6 + 20 - 9 - 13}{24}$$

$$= \frac{4}{24} = \frac{1}{6}$$

$$(3) 12\frac{1}{7} - 3\frac{1}{4} + 7\frac{1}{4} - \frac{1}{2} \text{ of } \frac{1}{7} + \frac{1}{2} \text{ of } 3\frac{1}{4} = 12\frac{11}{17} - \frac{21}{34} + 7\frac{16}{51}$$

$$- \frac{16}{51} + \frac{3}{2} = 12 + 7 + 1 + \frac{11}{17} - \frac{21}{34} + \frac{16}{51} - \frac{16}{51} + \frac{1}{2} = 20 +$$

$$\frac{66 - 63 + 32 - 32 + 51}{102} = 20 + \frac{54}{102} = 20\frac{9}{17}$$

$$(4) (16\frac{1}{2} - 3\frac{1}{4}) \text{ of } 3\frac{1}{2} - 16\frac{1}{4} + (3\frac{1}{2} \text{ of } 3\frac{1}{2}) = (16 - 3 + \frac{5-2}{8})$$

$$\text{of } \frac{16}{5} - 16\frac{5}{8} + (\frac{13}{4} \text{ of } \frac{16}{5}) = 13\frac{3}{8} \times \frac{16}{5} - 16\frac{5}{8} + 10\frac{2}{5} = \frac{107}{8}$$

$$\times \frac{16}{5} - 16\frac{5}{8} + 10\frac{2}{5} = 42\frac{4}{5} - 16\frac{5}{8} + 10\frac{2}{5} = 42 - 16 + 10 +$$

$$\frac{32 - 25 + 16}{40} = 36 + \frac{23}{40} = 36\frac{23}{40}$$

$$(5) 6\frac{1}{4} + \frac{1}{2} \text{ of } \frac{3}{4} \text{ of } 3\frac{1}{2} - \frac{11}{10} - 5\frac{1}{2} = 6\frac{1}{4} + (\frac{7}{12} \times \frac{9}{14} \times \frac{10}{3}) -$$

$$\frac{45}{60} - 5\frac{3}{4} = 6 + 1 - 5 + \frac{15 + 15 - 45 - 45}{60} = 1 + \frac{60 - 60}{60} = 1$$

$$\begin{aligned}
 (6) \quad 6\frac{1}{4} + \frac{7}{12} \text{ of } \frac{9}{14} \text{ of } (3\frac{1}{4} - \frac{45}{60}) - 5\frac{3}{4} &= 6\frac{1}{4} + \frac{7}{12} \text{ of } \frac{9}{14} \text{ of} \\
 \left(3\frac{4}{8} - 1\frac{47}{8} \right) - 5\frac{3}{4} &= 6\frac{1}{4} + \frac{7}{12} \text{ of } \frac{9}{14} \text{ of } \left(2 + \frac{80-45}{60} \right) - 5\frac{3}{4} \\
 &= 6\frac{1}{4} + \frac{7}{12} \text{ of } \frac{9}{14} \text{ of } \frac{31}{12} - 5\frac{3}{4} = 6\frac{1}{4} + \frac{31}{32} - 5\frac{3}{4} = 6 - 5 + \\
 &\quad \frac{8+31-24}{32} = 1\frac{15}{32}.
 \end{aligned}$$

$$\begin{aligned}
 (7) \quad 5\frac{89}{120} - \left(\frac{4}{5} + \frac{7}{8} + \frac{11}{12} \right) &= 5\frac{89}{120} - \left(\frac{96+105+110}{120} \right) = \\
 5\frac{89}{120} - 2\frac{71}{120} &= 5 - 2 + \frac{89-71}{120} = 3 + \frac{18}{120} = 3\frac{3}{20}.
 \end{aligned}$$

$$\begin{aligned}
 (8) \quad \frac{1}{3} \text{ of } \frac{3}{4} &= \frac{1}{4} = \text{B's pur}; \quad \frac{3}{4} - \frac{1}{4} = \frac{2}{4} = \frac{1}{2} \text{ rem'r.} \\
 \frac{1}{3} \text{ of } \frac{1}{2} &= \frac{1}{6} = \text{C's pur.}; \quad \frac{1}{2} - \frac{1}{6} = \frac{3-1}{6} = \frac{2}{6} = \frac{1}{3} \text{ rem'r.} \\
 \frac{1}{3} \text{ of } \frac{1}{3} &= \frac{1}{9} = \text{D's pur.}; \quad \frac{1}{3} - \frac{1}{9} = \frac{3-1}{9} = \frac{2}{9} = \text{A's rem'r.}
 \end{aligned}$$

Ex. XLVI. (p. 86.)

$$(1) \quad \frac{1}{2} \times \frac{1}{4} = \frac{1}{12}. \quad (2) \quad \frac{1}{2} \times \frac{1}{4} = \frac{35}{72}. \quad (3) \quad \frac{1}{12} \times \frac{5}{12} = \frac{5}{20}.$$

$$(4) \quad \frac{1}{8} \times \frac{1}{21} = \frac{1}{12}. \quad (5) \quad 7\frac{1}{2} \times 3\frac{1}{4} = \frac{15}{2} \times \frac{10}{3} = 25.$$

$$(6) \quad \frac{1}{4} \text{ of } \frac{1}{4} \times 17\frac{1}{4} = \frac{3}{4} \times \frac{1}{5} \times \frac{35}{2} = \frac{21}{8} = 2\frac{5}{8}.$$

$$(7) \quad \frac{1}{12} \text{ of } 1\frac{1}{2} \times 3\frac{1}{20} \times \frac{11}{12} = \frac{7}{12} \times \frac{8}{7} \times \frac{63}{20} \times \frac{13}{84} = \frac{13}{40}.$$

$$(8) \quad \frac{1}{2} \times 3\frac{1}{11} \times 19\frac{1}{2} \times \frac{11}{16} = \frac{5}{6} \times \frac{35}{11} \times \frac{96}{5} \times \frac{11}{56} = 10.$$

$$(9) \frac{7}{18} \text{ of } 1\frac{1}{10} \text{ of } 1\frac{1}{4} \times 2\frac{1}{2} \times 2\frac{1}{2} = \frac{7}{18} \times \frac{11}{10} \times \frac{27}{14} \times \frac{5}{2} \times \frac{16}{7} =$$

$$\frac{33}{7} = 4\frac{5}{7}.$$

$$(10) 1\frac{1}{8} \text{ of } 3\frac{1}{2} \times 4\frac{1}{2} \text{ of } 2\frac{1}{2} \times 13 = \frac{11}{16} \times \frac{15}{4} \times \frac{24}{5} \times \frac{45}{22} \times \frac{13}{1} =$$

$$\frac{5265}{16} = 329\frac{1}{16}.$$

$$(11) 2\frac{1}{2} \text{ of } (4\frac{1}{2} + 3\frac{1}{4}) \times \frac{1}{5} \text{ of } 2\frac{1}{5} \times 1\frac{1}{5} = \frac{57}{23} \times (4 + 3 +$$

$$\frac{14+25}{70}) \times \frac{11}{91} \times \frac{39}{19} \times \frac{70}{69} = \frac{57}{23} \times \frac{529}{70} \times \frac{11}{91} \times \frac{39}{19} \times \frac{70}{69} = \frac{33}{7}$$

$$= 4\frac{5}{7}.$$

$$(12) (3\frac{5}{6} - 1\frac{7}{12} + 1\frac{1}{3} - 2\frac{1}{2}) \times 38\frac{1}{2} \text{ of } \frac{2}{17} = (3 - 1 + 1 - 2 +$$

$$\frac{60 - 42 + 32 - 11}{72}) \times \frac{153}{4} \times \frac{2}{17} = \frac{37}{24} \times \frac{153}{4} \times \frac{2}{17} = \frac{111}{16} = 6\frac{15}{16}.$$

$$(13) \frac{1}{4} \text{ of } (\frac{1}{2} + \frac{1}{2} - 1\frac{1}{2} + \frac{1}{2}) \times \frac{1}{3} \text{ of } (2\frac{3}{8} + \frac{1}{2}) = \frac{3}{4} \text{ of}$$

$$(\frac{15+9-12+5}{45}) \times \frac{2}{3} \text{ of } (2 + \frac{3+10}{16}) = \frac{3}{4} \times \frac{17}{45} \times \frac{2}{3} \times \frac{45}{16}$$

$$= \frac{17}{32}.$$

$$(14) \{(\frac{1}{2} + \frac{1}{2}) \text{ of } (1\frac{1}{2} + 2\frac{1}{2})\} \times \{(2\frac{1}{4} - 1\frac{1}{2}) \text{ of } (3\frac{1}{10} - \frac{1}{2})\} =$$

$$(\frac{3+2}{6}) \times (1 + 2 + \frac{4+9}{12}) \times (2 - 1 + \frac{1-7}{14}) \text{ of } (3 + \frac{7-30}{70})$$

$$= \frac{5}{6} \times \frac{49}{12} \times \frac{4}{7} \times \frac{187}{70} = \frac{187}{36} = 5\frac{7}{36}.$$

$$(15) \left\{ 1\frac{1}{2} \text{ of } 26\frac{1}{2} \text{ of } (1 - \frac{1}{3}) \right\} \times \left\{ 2\frac{1}{2} \text{ of } (4\frac{1}{2} - 3\frac{1}{2}) \text{ of } \frac{15}{106} \right\} \\
\frac{10}{7} \text{ of } \frac{53}{2} \text{ of } \frac{1}{3} \times \left(2\frac{5}{8} \text{ of } \frac{8}{15} \text{ of } \frac{45}{106} \right) = \frac{10}{7} \times \frac{53}{2} \times \frac{1}{3} \times \frac{21}{8} \times \\
\frac{8}{15} \times \frac{45}{106} = \frac{15}{2} = 7\frac{1}{2}.$$

Ex. XLVII. (p. 86.)

$$(1) \frac{15}{20} \div \frac{7}{5} = \frac{15 \times 5}{20 \times 7} = \frac{21}{20} = 1\frac{1}{20}.$$

$$(2) \frac{2}{5} \div \frac{3}{8} = \frac{2 \times 8}{5 \times 3} = \frac{16}{15}.$$

$$(3) \frac{6}{11} \div \frac{5}{11} = \frac{6 \times 11}{11 \times 5} = \frac{6}{5}.$$

$$(4) 4\frac{1}{6} \div 6\frac{1}{8} = \frac{29}{6} \div \frac{55}{8} = \frac{29 \times 8}{6 \times 55} = \frac{116}{165}.$$

$$(5) 56 \div 5\frac{4}{7} = 56 \div \frac{40}{7} = \frac{56 \times 7}{1 \times 40} = \frac{49}{5} = 9\frac{4}{5}.$$

$$(6) 7\frac{4}{7} \div 4\frac{2}{21} = \frac{54}{7} \div \frac{86}{21} = \frac{54 \times 21}{7 \times 86} = \frac{81}{43} = 1\frac{38}{43}.$$

$$(7) \frac{1}{3} \text{ of } 20\frac{1}{4} \div 10\frac{3}{8} = \frac{1}{3} \times \frac{83}{4} \div \frac{83}{8} = \frac{83}{12} \times \frac{8}{83} = \frac{2}{3}.$$

$$(8) \frac{3}{5} \text{ of } 5\frac{1}{2} \div \frac{1}{2} \text{ of } 9 = \frac{3}{5} \times \frac{11}{2} \div \frac{5}{22} \times \frac{9}{1} = \frac{33}{10} \div \frac{45}{22} = \\
\frac{33 \times 22}{10 \times 45} = 1\frac{46}{75}.$$

$$(9) \left(\frac{3}{5} \text{ of } 7\frac{1}{2} - \frac{8}{17} \right) \div 1\frac{1}{9} = \left\{ \left(\frac{3}{5} \times \frac{15}{2} \right) - \frac{8}{17} \right\} \div \frac{11}{9} = \\
\left(\frac{9}{2} - \frac{8}{17} \right) \div \frac{11}{9} = \frac{137}{34} \div \frac{11}{9} = \frac{137 \times 9}{34 \times 11} = 3\frac{111}{374}.$$

$$(10) \left(\frac{1}{2} + \frac{1}{4} - \frac{1}{8}\right) \div \left(\frac{1}{4} + \frac{1}{8}\right) = \frac{4+15-10}{20} \div \frac{12+10}{15} = \frac{9}{20} \div \frac{22}{15} = \frac{9 \times 15}{20 \times 22} = \frac{27}{88}$$

$$(11) 6\frac{1}{4} \div 216 = \frac{27}{4} \div 216 = \frac{27 \times 1}{4 \times 216} = \frac{1}{32}$$

$$(12) \frac{1}{4} \div 2 = \frac{3 \times 1}{4 \times 2} = \frac{3}{8}$$

$$(13) \frac{4+\frac{1}{4}}{4-\frac{1}{4}} = \frac{4\frac{1}{4}}{3\frac{3}{4}} = \frac{17}{4} \div \frac{15}{4} = \frac{17 \times 4}{4 \times 15} = \frac{17}{15} = 1\frac{2}{15};$$

$$2 \text{ is the next whole number; } 2 - 1\frac{2}{15} = \frac{13}{15}$$

EX. XLVIII. (p. 87.)

$$(1) \frac{6\frac{1}{2}}{3\frac{1}{2}} = 4\frac{1}{2} \div 3\frac{1}{2} = 4\frac{1}{2} \times \frac{2}{3} = 3\frac{1}{3} = 3\frac{1}{3}$$

$$(2) \frac{6\frac{1}{2}}{2\frac{1}{2}} = 6 \div 2\frac{1}{2} = 6 \times \frac{2}{5} = \frac{12}{5} = 2\frac{2}{5}$$

$$(3) \frac{2\frac{1}{2}}{6} = \frac{5}{2} \div 6 = \frac{5}{2} \times \frac{1}{6} = \frac{5}{12}$$

$$(4) \frac{6\frac{1}{2}}{3\frac{1}{2}} = 7\frac{1}{2} \div 1\frac{1}{2} = 7\frac{1}{2} \times \frac{2}{3} = 5 = 5$$

$$(5) \frac{5}{2\frac{1}{2}} = 5 \div 2\frac{1}{2} = 5 \times \frac{2}{5} = 2 = 2$$

$$(6) \frac{7\frac{1}{2}}{4\frac{1}{2}} = \frac{7}{4\frac{1}{2}} \div \frac{145}{36} = \frac{7}{4\frac{1}{2}} \times \frac{36}{145} = \frac{28}{725}$$

$$(7) \frac{1\frac{1}{2} \text{ of } 1\frac{1}{2}}{1\frac{1}{2} \text{ of } 1\frac{1}{2}} = \frac{\frac{3}{2} \times \frac{3}{2}}{\frac{3}{2} \times \frac{3}{2}} = 2 \times \frac{1}{1} = 2 = 2$$

$$(8) \frac{7\frac{1}{2}}{2\frac{1}{2}} = \frac{15}{2} \div \frac{5}{2} = \frac{15}{2} \times \frac{2}{5} = 3 = 3$$

$$(9) \frac{5\frac{1}{2} + 6\frac{1}{2}}{6\frac{1}{2} - 5\frac{1}{2}} = \frac{11\frac{1}{2}}{1\frac{1}{2}} = \frac{23}{3} \div \frac{1}{3} = 23 \times 3 = 69$$

$$(10) \frac{\frac{1}{2} + \frac{1}{3} + \frac{1}{4}}{\frac{8}{9} + \frac{6}{6} - \frac{1}{12}} = \frac{\frac{3}{6} + \frac{2}{6} + \frac{1}{6}}{\frac{8}{9} + \frac{6}{6} - \frac{1}{12}} = \frac{\frac{14}{6}}{\frac{35}{18}} = \frac{140}{35} = 4 \times \frac{4}{7} = 1\frac{3}{7}$$

$$(11) \left\{ \frac{3\frac{1}{2}}{7} + \frac{2}{10\frac{1}{2}} - \frac{1}{8} \text{ of } 4 \right\} \times 1\frac{1}{2} = \left(\frac{19}{14} + \frac{4}{21} - \frac{1}{2} \right) \times \frac{3}{2} = \frac{33}{8} \times \frac{3}{2} = \frac{99}{4}$$

$$(12) \left(\frac{5\frac{1}{2}}{31\frac{1}{2}} \text{ of } \frac{9}{14} \right) + \left(\frac{3\frac{1}{2}}{3\frac{1}{2}} \text{ of } 15 \right) = \frac{1}{2} \times \frac{9}{14} \times \frac{1}{2} + \frac{1}{2} \times \frac{1}{2} \times 15 = \frac{9}{56} + \frac{15}{4} = \frac{99}{56} \times \frac{1}{2} = \frac{99}{112}$$

$$(13) \frac{5\frac{1}{2} + 7\frac{1}{2}}{2\frac{1}{2} - 1\frac{1}{2}} \text{ of } \frac{2\frac{1}{2} \times 8\frac{1}{2}}{4\frac{1}{2} + (\frac{1}{2} - \frac{1}{2})} = \frac{5}{\frac{1}{2}} \text{ of } \frac{15}{2} = 15$$

$$(14) \frac{13}{2\frac{1}{2} + \frac{1}{2}} + \frac{1\frac{1}{2}}{3\frac{1}{2}} - 1\frac{1}{2} = \frac{13}{3} + \frac{1}{2} - 1\frac{1}{2} = \frac{13}{3} = 4\frac{1}{3}$$

Ex. XLIX. (p. 88.)

$$(1) \frac{2}{5} \text{ of } \$1 = \frac{2 \times 100}{5} \text{ cts.} = 40 \text{ cts.}$$

$$(2) \frac{3}{8} \text{ ml.} = \frac{3 \times 8}{8} \text{ fur.} = 3 \text{ fur.}$$

$$(3) \frac{3}{7} \text{ cwt.} = \frac{3 \times 4}{7} \text{ qrs.} = 1\frac{5}{7} \text{ qrs.; } \frac{5}{7} \text{ qr.} = \frac{5 \times 25}{7} \text{ lbs.} = 17\frac{6}{7} \text{ lbs.; } \frac{6}{7} \text{ lb.} = \frac{6 \times 16}{7} \text{ oz.} = 13\frac{5}{7} \text{ oz.; } \frac{5}{7} \text{ oz.} = \frac{5 \times 16}{7} \text{ drs.} = 11\frac{3}{7} \text{ drs.; } \therefore \text{ value is 1 qr., 17 lbs., 13 oz., } 11\frac{3}{7} \text{ drs.}$$

$$(4) \frac{9}{20} \text{ of 2 tons, 3 cwt.} = \frac{9 \times 43}{20} \text{ cwt.} = 19\frac{7}{20} \text{ cwt.; } \frac{7}{20} \text{ cwt.} \\ = \frac{7 \times 4}{20} \text{ qrs.} = 1\frac{8}{20} \text{ qrs.; } \frac{8}{20} \text{ qrs.} = \frac{8 \times 25}{20} \text{ lbs.} = 10 \text{ lbs.;} \\ \therefore \text{value is 19 cwt. 1qr. 10 lbs.}$$

$$(5) \frac{3}{16} \text{ of 3 mls., 2 fur.,} = \frac{3 \times 26}{16} \text{ fur.} = 4\frac{7}{8} \text{ fur.; } \frac{7}{8} \text{ fur.} = \\ \frac{7 \times 40}{8} \text{ per.} = 35 \text{ per.; } \therefore \text{value is 4 fur. 35 per.}$$

$$(6) \frac{4}{5} \text{ of 3 ac., 2 per., 3 yds.} = \frac{(3 \text{ ac., 2 per., 3 yds.}) \times 4}{5} = \\ \frac{12 \text{ ac., 8 per., 12 yds.}}{5} = 2 \text{ ac., 1 ro., 25 per., 20 yds., 4 ft.,} \\ 136\frac{1}{2} \text{ in.}$$

$$(7) \frac{5}{6} \text{ of 5 lbs., 13 dwts.} = \frac{(5 \text{ lbs., 13 dwts.}) \times 5}{6} = \\ \frac{25 \text{ lbs., 3 oz., 5 dwts.}}{6} = 4 \text{ lbs., 2 oz., 10 dwts., 20 grs.}$$

$$(8) \frac{7}{8} \text{ of 68 yds., 2 nls.} = \frac{(68 \text{ yds., 2 nls.}) \times 7}{8} = \\ \frac{476 \text{ yds., 3 qrs., 2 nls.}}{8} = 59 \text{ yds., 2 qrs., 14 nls.}$$

$$(9) \frac{3}{11} \text{ of £26 8s. 11d.} = \frac{(\text{£26 8s. 11d.}) \times 3}{11} = \\ \frac{\text{£79 6s. 9d.}}{11} = \text{£7 4s. 3d.}$$

$$(10) \frac{6}{7} \text{ of 128 lbs., 2 sc.} = \frac{(128 \text{ lbs., 2 sc.}) \times 6}{7} = \\ \frac{768 \text{ lbs., 4 drs.}}{7} = 109 \text{ lbs., 8 oz., 5 drs. 8}\frac{1}{2} \text{ grs.}$$

$$(11) \frac{7}{8} \text{ of } \frac{3}{5} \text{ of } 10\frac{2}{3} \text{ hrs.} = \frac{28}{5} \text{ hrs.} = 5\frac{3}{5} \text{ hrs.}; \frac{3}{5} \text{ hrs.} = 36 \text{ min.}; \therefore \text{value is } 5 \text{ hrs., } 36 \text{ min.}$$

$$(12) \frac{3}{5} \text{ lbs.} = 9\frac{3}{5} \text{ oz.}; \frac{3}{5} \text{ oz.} = 9\frac{3}{5} \text{ drs.}; 7 \text{ lbs., } 9 \text{ oz., } 9\frac{3}{5} \text{ drs.}$$

$$(13) \frac{6}{7} \text{ of } \frac{2}{3} \text{ of } \$42 = \frac{4}{7} \text{ of } \$42 = \$24.$$

$$(14) \frac{8}{10} \text{ dy.} = 7\frac{1}{5} \text{ hrs.}; \frac{1}{5} \text{ hr.} = 12 \text{ min.}; 7 \text{ hrs. } 12 \text{ min.}$$

$$(15) \frac{9}{16} \text{ of } 24 \text{ cds.} = 13\frac{1}{2} \text{ cds.}; \frac{1}{2} \text{ cd.} = 64 \text{ c. ft.};$$

$$\therefore \text{value is } 13 \text{ cds., } 64 \text{ c. ft.}$$

Ex L. (p. 88.)

$$(1) 3s. 4d. = 40d., £1 = 240d.; \therefore \text{fract}^n. = \frac{40}{240} = \frac{1}{6}.$$

$$(2) 2 \text{ r., } 13 \text{ per.} = 93 \text{ per., } 3 \text{ ac.} = 480 \text{ per.}; \therefore \text{fract}^n. = \frac{93}{480} = \frac{31}{160}.$$

$$(3) 3 \text{ wks., } 16 \text{ min.} = 30256 \text{ min., } \frac{1}{4} \text{ hr.} = 30 \text{ min.};$$

$$\therefore \text{fract}^n. = \frac{30256}{30} = \frac{15128}{15}.$$

$$(4) 1 \text{ lb., } 1 \text{ oz., } 3 \text{ dwts.} = 263 \text{ dwts., } 2 \text{ lbs.} = 480 \text{ dwts.};$$

$$\therefore \text{fract}^n. = \frac{263}{480}.$$

$$(5) 1 \text{ lb., } 5 \text{ oz.} = 408 \text{ sc., } 2 \text{ lbs., } 1 \text{ sc.} = 577 \text{ sc.};$$

$$\therefore \text{fract}^n. = \frac{408}{577}.$$

$$(6) 8 \text{ ac., } 3 \text{ r.} = 1400 \text{ per., } 2 \text{ ac., } 32 \text{ per.} = 352 \text{ per.};$$

$$\therefore \text{fract}^n = \frac{1400}{352} = \frac{175}{44}.$$

$$(7) 4 \text{ yds., } 2 \text{ ft., } 120 \text{ in.} = 3000 \text{ in., } 3 \text{ per., } 13\frac{1}{4} \text{ yds., } 1 \text{ ft.,}$$

$$72 \text{ in.} = 135000 \text{ in.}; \therefore \text{fract}^n = \frac{3000}{135000} = \frac{1}{45}.$$

$$(8) £1 \text{ } 18\text{s.} = 38\text{s., } £7 = 140\text{s.}; \therefore \text{fract}^n = \frac{38}{140} = \frac{19}{70}.$$

$$(9) 2 \text{ bu., } 1 \text{ pk.} = 18 \text{ gals., } 4 \text{ bu., } 1 \text{ gal.} = 33 \text{ gals.};$$

$$\therefore \text{fract}^n = \frac{18}{33} = \frac{6}{11}.$$

$$(10) \$209, \$5643; \therefore \text{fract}^n = \frac{209}{5643} = \frac{6}{11}.$$

$$(11) 2 \text{ yds., } 2 \text{ ft.} = 96 \text{ in., } 13 \text{ per., } 3 \text{ yds., } 6 \text{ in.} = 2688 \text{ in.};$$

$$\therefore \text{fract}^n = \frac{96}{2688} = \frac{1}{28}.$$

$$(12) 1 \text{ lb. Troy,} = 5760 \text{ grs., } 1 \text{ lb. avoird.} = 7000 \text{ grs.};$$

$$\therefore \text{fract}^n = \frac{5760}{7000} = \frac{144}{175}.$$

$$(13) 3 \text{ qts., } 7 \text{ bu.} = 224 \text{ qts.}; \therefore \text{fract}^n = \frac{3}{224}.$$

$$(14) 1\frac{1}{4} \text{ yds.} = 54 \text{ in., } 4 \text{ mls., } 2 \text{ fur.} = 269280 \text{ in.};$$

$$\therefore \text{fract}^n = \frac{54}{269280} = \frac{3}{14960}.$$

$$(15) 1 \text{ yd. } 4 \text{ in.} = 1300 \text{ in., } 5 \text{ ac., } 11 \text{ per.} = 3140240\frac{1}{4} \text{ in.};$$

$$\therefore \text{fract}^n = \frac{1300}{3140240\frac{1}{4}} = \frac{325}{7850601}.$$

Ex. LI. (p. 89.)

$$(1) \frac{\frac{3}{4} \text{ of } \$14}{\frac{1}{4} \text{ of } \$16} = \frac{3}{7} \times \frac{14}{1} \times \frac{2}{1} \times \frac{1}{16} = \frac{1}{2}.$$

$$(2) \frac{\frac{3}{4} \text{ of } 2 \text{ ac., } 2 \text{ ro.}}{\frac{1}{4} \text{ of } 3 \text{ ac., } 2 \text{ per.}} = \frac{\frac{3}{4} \text{ of } 400 \text{ per.}}{\frac{1}{4} \text{ of } 482 \text{ per.}} = \frac{3}{5} \times \frac{400}{1} \times \frac{9}{1} \times \frac{1}{482} \\ = \frac{1080}{241}.$$

$$(3) \frac{2\frac{1}{2} \text{ of } 3 \text{ lbs., } 6 \text{ dwt.}}{1\frac{1}{2} \text{ of } 6 \text{ lbs., } 12 \text{ grs.}} = \frac{\frac{5}{2} \text{ of } 17424 \text{ grs.}}{\frac{3}{2} \text{ of } 34572 \text{ grs.}} = \frac{5}{2} \times \frac{17424}{1} \\ \times \frac{3}{4} \times \frac{1}{34572} = \frac{5445}{5762}.$$

$$(4) \frac{12\frac{1}{2} \text{ of } 3\text{s. } 6\text{d.}}{\text{£}1} = \frac{4\frac{1}{2} \text{ of } 42\text{d.}}{240\text{d.}} = \frac{51}{4} \times \frac{42}{1} \times \frac{1}{240} = \frac{357}{160}.$$

$$(5) \frac{3\frac{1}{2} \text{ of } 10 \text{ cwt., } 2 \text{ qrs.}}{1 \text{ Ton.}} = \frac{1\frac{1}{2} \text{ of } 42 \text{ qrs.}}{80 \text{ qrs.}} = \frac{10}{3} \times \frac{42}{1} \times \frac{1}{80} = \frac{7}{4}.$$

$$(6) \frac{3\frac{1}{2} \text{ of } 2 \text{ ac., } 3 \text{ ro.}}{2 \text{ ro., } 2\frac{1}{2} \text{ per.}} = \frac{\frac{7}{2} \text{ of } 880 \text{ hf. per.}}{165 \text{ hf. per.}} = \frac{7}{2} \times \frac{880}{1} \times \\ \frac{1}{165} = \frac{56}{3}.$$

$$(7) \frac{\frac{5}{8} \text{ of } 1 \text{ lb. Troy}}{1 \text{ lb. Avoir.}} = \frac{\frac{5}{8} \text{ of } 5760 \text{ grs.}}{7000 \text{ grs.}} = \frac{5}{8} \times \frac{5760}{1} \times \frac{1}{7000} = \frac{18}{35}.$$

$$(8) 1\frac{3}{17} \text{ of } \frac{\text{£}2 \text{ 4s. } 7\frac{1}{2}\text{d.}}{2\text{s.}} = \frac{1\frac{1}{2} \text{ of } 1071 \text{ half-pence}}{120 \text{ half-pence}} = \frac{20}{17} \times \\ \frac{1071}{1} \times \frac{1}{120} = \frac{21}{2}.$$

$$(9) \frac{\frac{3}{11} \text{ of } 2\frac{1}{2} \text{ mls.}}{\frac{1}{4} \text{ of } \frac{7}{8} \text{ mls.}} = \frac{\frac{3}{11} \text{ of } 1\frac{1}{2} \text{ mls.}}{\frac{1}{4} \text{ of } \frac{7}{8} \text{ mls.}} = \frac{3}{11} \times \frac{11}{4} \times \frac{2}{1} \times \frac{9}{7} = \frac{27}{14}.$$

$$(10) \frac{6\frac{1}{2} \text{ of } 3 \text{ cords}}{5 \text{ cord ft.}} = \frac{1\frac{1}{2} \text{ of } 24 \text{ cd. ft.}}{5 \text{ cd. ft.}} = \frac{13}{2} \times \frac{24}{1} \times \frac{1}{5} = \frac{156}{5}.$$

$$(11) \frac{8\frac{1}{2} \text{ of } 6 \text{ lbs., } 2 \text{ sc.}}{1 \text{ lb.}} = \frac{2\frac{1}{2} \text{ of } 1730 \text{ sc.}}{288 \text{ sc.}} = \frac{25}{8} \times \frac{1730}{1} \times \frac{1}{288} = \frac{21625}{432}.$$

$$(12) \frac{\frac{1}{2} \text{ of } \frac{1}{2} \text{ of } \$21}{\$7} = \frac{4}{7} \times \frac{2}{3} \times \frac{21}{1} \times \frac{1}{7} = \frac{8}{7}.$$

$$(13) \frac{\frac{2}{3} \text{ of } 8 \text{ yds., } 2 \text{ nls.}}{2\frac{1}{2} \text{ ells Eng.}} = \frac{\frac{2}{3} \text{ of } 130 \text{ nls.}}{1\frac{1}{2} \text{ nls.}} = \frac{9}{16} \times \frac{130}{1} \times \frac{8}{140} = \frac{851}{224}.$$

$$(14) \frac{2\frac{1}{2} \text{ of } 10 \text{ hrs.}}{1 \text{ dv.}} = \frac{2\frac{1}{2} \text{ of } 10 \text{ hrs.}}{24 \text{ hrs.}} = \frac{23}{8} \times \frac{10}{1} \times \frac{1}{24} = \frac{115}{96}.$$

Ex. LII. (p. 92.)

- (1) $\frac{2}{3}$ of $\frac{1}{2} = \frac{1}{3} =$ what A sells to C .
 $\frac{1}{12}$ of $\frac{1}{2} = \frac{1}{24} =$ what A sells to B .
 $\frac{1}{2} - (\frac{1}{3} + \frac{1}{24}) = \frac{1}{8} = A$'s remaining portion
 $\frac{1}{8} + \frac{1}{24} = \frac{1}{6} = B$'s portion.
 $\frac{1}{3} = C$'s portion.
- (2) (1) $9 + \frac{3}{4} = 24$.
 (2) $4\frac{1}{2} + 3\frac{2}{5} = 8\frac{7}{10}$; $4\frac{1}{2} - 3\frac{2}{5} = \frac{3}{10}$; $8\frac{7}{10} - \frac{3}{10} = 7\frac{4}{10}$.
- (3) Lesser fraction $= (\frac{3}{8} - \frac{1}{8}) \div 2 = \frac{1}{8}$.
 Greater fraction $= \frac{3}{8} - \frac{1}{8}$ or $\frac{1}{10} + \frac{3}{8} = \frac{13}{40}$.
- (4) (1) $1\frac{1}{2}$ of $2\frac{3}{4} = 3\frac{3}{4}$; $3\frac{3}{4} + \frac{7}{4} = 1\frac{1}{2}$.
 (2) $\frac{1}{2}$ of $2\frac{1}{2} = \frac{5}{4}$; $3\frac{3}{4} - \frac{5}{4} = 1\frac{1}{2}$.
- (5) A gives $B \frac{1}{2}$ of his money; $\therefore$ he has $\frac{1}{2}$ rem'g.
 He then gives $C \frac{1}{3}$ of $\frac{1}{2} = \frac{1}{6}$ and has rem'g $\frac{1}{2} - \frac{1}{6} = \frac{1}{3}$.
 He next gives $D \frac{1}{4}$ of $\frac{1}{3} = \frac{1}{12}$ and has rem'g $\frac{1}{3} - \frac{1}{12} = \frac{1}{4}$.
 $\therefore A$ has $\frac{1}{4}$ and D has $\frac{1}{12}$; or A has twice as much as D .
- (6) She spends $\frac{1}{2}$ leaving $\frac{1}{2}$; next spends $\frac{1}{4}$ of $\frac{1}{2} = \frac{1}{4}$; hence she has spent $\frac{1}{2} + \frac{1}{4} = \frac{3}{4}$; and has left $\frac{1}{4}$, which by question $= \$4.20$; $\therefore$ her whole sum was $\$4.20 \times 6 = \25.20 .

- (7) $\frac{1}{11} = \$90$; $\therefore \frac{1}{11} = \30 ; $\therefore$ value of vessel = $\$30 \times 11 = \330 . $\therefore \frac{1}{11} = \110 .
- (8) $100 \text{ cts.} - 5 \text{ cts.} = 95 \text{ cts.}$; $\therefore$ whole income = $\frac{100}{95} \times \$855 = \900 .
- (9) $\frac{1}{3} = \frac{1}{4}$ = amount of reduction; hence $\frac{1}{3}$ of $\$54 = \36 = amount of reduction.
- (10) $\frac{1}{4}$ of a rabbit is worth $\frac{1}{3} \text{ s.}$; $\therefore \frac{1}{4}$ is worth $\frac{1}{3} \text{ s.} = 2 \text{ d.}$ and a rabbit is worth $2 \text{ d.} \times 7 = 1 \text{ s. } 2 \text{ d.}$; $\therefore \frac{1}{3}$ of a rabbit is worth $8 \frac{2}{3} \text{ d.}$ = the worth of $\frac{1}{5}$ of a pig; $\therefore$ a pig is worth $20 \times 8 \frac{2}{3} \text{ d.} = 14 \text{ s.}$ and 100 pigs are worth $100 \times 14 \text{ s.} = £70$.
- (11) 1 rifleman shoots $2 \frac{2}{7}$ rounds in 91 minutes, or in 1 minute $\frac{26}{7 \times 91} = \frac{2}{49}$ of a round; $\therefore$ 37 riflemen in $4 \frac{1}{4}$ hrs. (or 255 min.) will shoot $(\frac{2}{49} \times 37 \times 255)$ rounds = $385 \frac{1}{7}$ rounds.
- (12) $\frac{1}{8} = \$12.60$; $\therefore \frac{1}{4} = \4.20 , and whole = $8 \times \$4.20 = \33.60 .
- (13) 28 sheep eat as much as 15 cows;
 $\therefore$ 1 sheep eats as much as $\frac{1}{2} \frac{1}{4}$ cow;
 $\therefore$ 20 sheep eat as much as $\frac{1}{2} \frac{1}{4} \times 20 = 10 \frac{1}{2}$ cows;
 33 cows and 20 sheep = 33 cows + $10 \frac{1}{2}$ cows = $43 \frac{1}{2}$ cows;
 15 cows graze in 11 days 5 ac.;
 $\therefore$ 1 cow grazes in 1 day $\frac{5}{15 \times 11}$ or $\frac{1}{33}$ ac.;
 $\therefore$ $43 \frac{1}{2}$ cows graze in 1 day $\frac{1}{33} \times 43 \frac{1}{2}$, or $1 \frac{1}{2} \frac{2}{3}$ ac.
 $\therefore$ $43 \frac{1}{2}$ cows graze 18 ac. in $18 \div 1 \frac{1}{2} \frac{2}{3}$ days, or $\frac{18 \times 77}{103}$
 = $13 \frac{1}{7}$ days.
- (14) (1) A is to have half as much again as B, $\therefore$ $\$94.50$ must be divided into 5 equal shares of which A is to have 3 and B 2; $\$94.50 \div 5 = \18.90 ; $\$18.90 \times 3 = \$56.70 = A$'s share; $\$18.90 \times 2 = \$37.80 = B$'s share.

(Continued on next page.)

(14 continued.)

(7) B is to have half A 's share or A is to have twice B 's; $\therefore$ \$94.50 must be divided into equal shares, of which A is to have 2 and B 1
 $\$94.50 \div 3 = \31.50 ; $\$31.50 \times 2 = \$63.00 = A$'s share
 $\$31.50 \times 1 = \$31.50 = B$'s share.

(15) Amount of debt = $\$500 + (\$250 \times 2) + (\$75 \times 3) = \1225 ; amount of property = $\$625$; $\therefore$ he will pay $\$1225 = \250 in the $\$$ and the first creditor will receive $\$500 \times \frac{2}{3} = \$255.10\frac{1}{3}$.

(16) \$750 would purchase $\frac{750}{70000} = \frac{3}{280}$ of the mine; $\therefore$ $\frac{3}{280}$ of the man's share = $\frac{3}{280}$ of the whole mine; and his entire share = $(\frac{3}{280} + \frac{3}{280})$ of the mine = $\frac{3}{140}$.

(17) The first and second div^{ns}. contain $\frac{1}{2} + \frac{1}{3} = \frac{5}{6}$ of the entire school, therefore the remaining, or $\frac{1}{6}$ must belong to the third divⁿ., which by the question contains 80. If $80 = \frac{1}{6}$, $\frac{1}{6} = \frac{1}{6}$ of $80 = 10$, and the whole, or $\frac{5}{6} = 25 \times 10 = 250$.

(18) A can do in 1 day $\frac{1}{10}$; B can do in 1 day $\frac{1}{15}$; therefore A and B together do in 1 day $\frac{1}{10} + \frac{1}{15} = \frac{1}{6}$; $\therefore$ no of days in which A and B will together do the whole work

$$\text{work} = \frac{\text{whole work}}{\text{part done in one day}} = \frac{1}{\frac{1}{6}} = 6 \frac{1}{6} \text{ days.}$$

(19) Eldest son rec'd $\frac{1}{3}$ leaving $\frac{2}{3}$.
 Second son rec'd $\frac{1}{3}$ of $\frac{2}{3} = \frac{2}{9}$.
 Widow rec'd $1 - (\frac{1}{3} + \frac{2}{9}) = \frac{4}{9}$.
 Also by the question $\frac{1}{3} - \frac{2}{9} = \frac{1}{9}$ (the eldest son's share minus the second son's) = \$1690, or $\frac{1}{9} = \$1690$; $\therefore$ whole property = $\frac{\$1690}{\frac{1}{9}} = \6250 .
 Eldest son rec'd $\frac{1}{3}$ of \$6250 = \$3250.
 Second son rec'd $\frac{2}{9}$ of 6250 = \$1560.
 Widow rec'd $\frac{4}{9}$ of \$6250 = \$1440.

(20) Since C receives 9 ac. more than A and B ; $\therefore$ 85 ac., 2 ro. - 9 ac. must be equally divided be-
 (Continued on next page.)



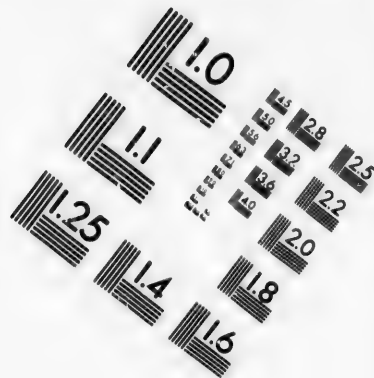
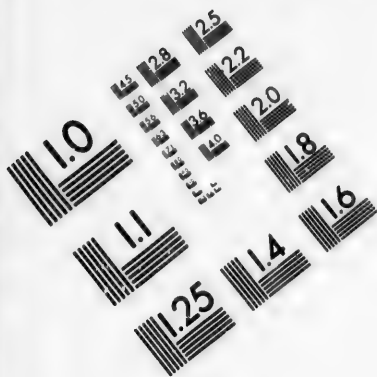
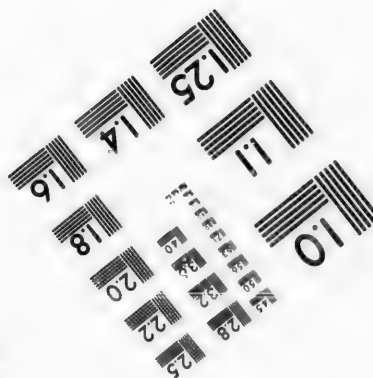
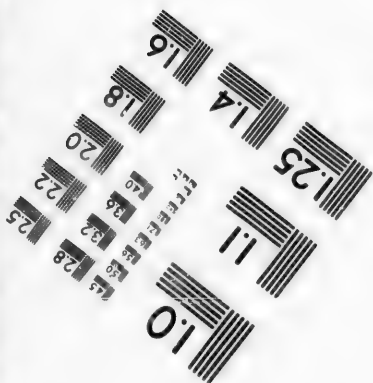
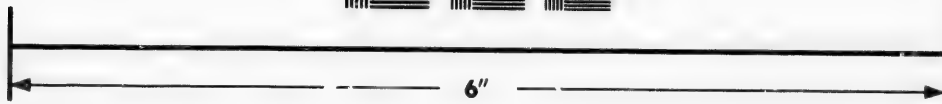
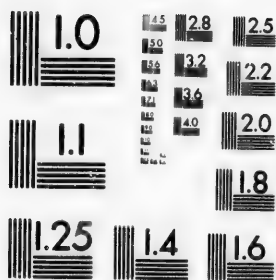


IMAGE EVALUATION TEST TARGET (MT-3)



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(20 continued.)

tween A , B , and C ; hence A 's and B 's share =
 $\frac{76 \text{ ac., 2 ro.}}{2} = 38 \text{ ac., 1 ro.}$

If A receives 1, B receives $\frac{1}{11}$, $\therefore A$'s and B 's = $1\frac{1}{11}$.
 $\therefore A$'s = $(38 \text{ ac., 1 ro.}) \times \frac{1}{11} = 24 \text{ ac., 3 ro.,}$
 B 's = $13 \text{ ac., 2 ro., } C$'s = 47 ac. 1 ro.

(21) 3 boys (one out of each third) paid $(19+30+42)$ cts.
 $= 90$ cts.; $\therefore$ the average payment made by each
 boy = $\frac{90}{3} = 30$ cts.; $\therefore$ no. of boys = $\frac{1170}{30} = 48$.

(22) First pipe fills $\frac{1}{8}$ of the cistern per minute; second
 and third pipes empty $\frac{1}{4} + \frac{1}{4} = \frac{1}{2}$ of the cistern per
 minute; $\therefore$ part of cistern filled per minute = $\frac{1}{8} -$
 $\frac{1}{2} = -\frac{3}{8}$. $\therefore$ No. of minutes = $\frac{\text{cistern}}{\text{part filled a min.}} =$
 $\frac{1}{-\frac{3}{8}} = 42$.

(23) (1) A and B do in 1 day $\frac{1}{30}$ of the work.
 B does in 1 day $\frac{1}{60}$ of the work.
 $\therefore A$ does in 1 day $\frac{1}{30} - \frac{1}{60} = \frac{1}{60}$ of the work.
 $\therefore A$ can do the whole in $\frac{1}{\frac{1}{60}}$ days = $52\frac{1}{2}$ days.

(2) A does $\frac{1}{60} - \frac{1}{60} = \frac{1}{120}$ more than B in 1 day.
 $\therefore A$ does $\frac{1}{120} \times 30 = \frac{1}{4}$ more than B in 30 days.

(24) A and B do $\frac{1}{30}$ of the work in 1 day.
 A and C do $\frac{1}{15}$ of the work in 1 day.
 $\therefore 2 A, B$, and C do $\frac{1}{30} + \frac{1}{15} = \frac{1}{10}$ of the work in 1
 day.
 But A, B , and C do $\frac{1}{15}$ of the work in 1 day;
 $\therefore A$ does $\frac{1}{10} - \frac{1}{15} = \frac{1}{30}$ of the work in 1 day;
 $\therefore$ no. of days required by $A = \frac{\text{whole work}}{\text{part done in 1 day}}$
 $= \frac{1}{\frac{1}{30}} = 15 \frac{1}{2}$.

(25) $\frac{1}{2}$ remains in 1st. $\therefore \frac{1}{2}$ is put into 2nd, 3^d. holds $\frac{1}{2} -$
 $(\frac{1}{2} \text{ of } \frac{1}{2}) = \frac{1}{4}$; and fills $\frac{1}{4}$ of 4th. cask, which con-
 (Continued on next page.)

share =

's = 1 $\frac{1}{4}$.

+42) cts.

by each

44 $\frac{1}{2}$ = 48.

; second

tern per

te = $\frac{1}{8}$ -

1

min. =

work.

days.

day.

30 days.

ork in 1

y;

ay;

ork

1 day

lds $\frac{1}{2}$ -

h con-

(25 continued.)

sequently holds $\frac{2}{8} + \frac{1}{8} = \frac{3}{8}$; $\therefore$ 3^d. and 4th. together hold $\frac{2}{8} + \frac{1}{8} = \frac{3}{8}$ leaving when taken from first cask $\frac{5}{8}$, which by the question is equivalent to 15 gallons;

$\therefore$ 1st. cask holds $\frac{15}{\frac{5}{8}} = 140$ gallons,

2nd. cask holds $\frac{3}{8}$ of 140 = 60 gallons,

3rd. cask holds $\frac{2}{8}$ of 140 = 45 gallons,

4th. cask holds $\frac{1}{8}$ of 140 = 80 gallons.

(36) While A does $\frac{1}{2}$ the work B does $\frac{1}{3}$;

$\therefore$ while A does the whole work B does $\frac{2}{3}$;

$\therefore$ while A does the whole work A and B do $\frac{5}{6}$.

But A and B do the work in 12 days; $\therefore$ A requires $\frac{4}{5}$ of 12 days = 20 days to complete the work alone.

Ex. LIII. (p. 95.)

(1) $\cdot 3 = \frac{3}{10}$; $\cdot 13 = \frac{13}{100}$; $\cdot 19 = \frac{19}{100}$; $\cdot 301 = \frac{301}{1000}$; $\cdot 270 = \frac{270}{1000}$; $\cdot 5653 = \frac{5653}{10000}$.

(2) $\cdot 504 = \frac{504}{1000}$; $\cdot 73201 = \frac{73201}{100000}$; $\cdot 701003 = \frac{701003}{1000000}$; $\cdot 03 = \frac{3}{100}$; $\cdot 0045 = \frac{45}{10000}$.

(3) $\cdot 300 = \frac{300}{1000}$; $18.741 = 18\frac{741}{1000} = 18\frac{741}{1000}$; $2.1 = 2\frac{1}{10} = 2\frac{1}{10}$; $\cdot 11 = \frac{11}{100}$; $\cdot 000001 = \frac{1}{1000000}$; $5.0007 = 5\frac{7}{100000} = 5\frac{7}{100000}$.

(4) $347.02007 = 347\frac{2007}{100000} = 347\frac{2007}{100000}$; $500.005 = 500\frac{5}{1000} = 500\frac{1}{200}$; $5.60746805 = 5\frac{60746805}{10000000} = 5\frac{60746805}{10000000}$; $\cdot 0000500 = \frac{500}{1000000} = \frac{1}{2000}$.

(5) $29.0050 = 29\frac{50}{10000} = 29\frac{1}{200}$; $20.607 = 20\frac{607}{1000} = 20\frac{607}{1000}$; $5.00038 = 5\frac{38}{100000} = 5\frac{19}{50000}$.

Ex. LIV. (p. 96.)

(1) $\frac{1}{10} = \cdot 1$; $\frac{1}{5} = \cdot 2$; $\frac{2}{5} = \cdot 4$; $\frac{3}{5} = \cdot 6$; $\frac{4}{5} = \cdot 8$; $\frac{1}{100} = \cdot 01$; $\frac{1}{1000} = \cdot 001$; $\frac{1}{10000} = \cdot 0001$.

(2) $\frac{1}{1000} = 0.001$; $\frac{1}{100000} = 0.00001$; $\frac{1}{100} = 0.01$; $\frac{1}{1000000} = 0.000001$.

(3) $\frac{35400}{1000} = 35.4$; $\frac{1700701}{100000} = 17.00701$; $\frac{2076854}{100000} = 20.76854$;
 $\frac{00000002}{100000000} = .0000002$; $\frac{0000053052}{1000000000} = .0000053052$.

(4) Seven tenths = .7; thirty thousandths = .030.

(5) Three hundred and three thousandths = 300.003;
 one ten thousandth = .0001.

(6) Four, and five hundred and four millionths = 4.000504; seventy ten millionths = .0000070.

(7) .6 = six tenths; .17 = seventeen hundredths; .07 = seven hundredths.

(8) .007 = seven thousandths; .700 = seven hundred thousandths or seven tenths; 6.3004 = six and three thousand and four ten thousandths.

(9) 35.00205 = thirty-five and two hundred and five hundred thousandths; 400.34000 = four hundred, and thirty-four thousand one hundred thousandths, or four hundred and thirty-four hundredths.

(10) $3 \times 10 = 3$; $3 \times 100 = 30$; $3 \times 1000 = 3000$; $3 \times 10000000 = 30000000$; $.13 \times 10 = 1.3$; $.13 \times 100 = 13$; $.13 \times 1000 = 1300$; $.13 \times 1000000 = 1300000$; $.013 \times 10 = .13$; $.013 \times 100 = 1.3$; $.013 \times 1000 = 130$; $.013 \times 1000000 = 130000$; $54.0003 \times 10 = 540.003$; $54.0003 \times 100 = 5400.03$; $54.0003 \times 1000 = 54000.3$; $54.0003 \times 1000000 = 54000300$; $7420.1 \times 10 = 74201$; $7420.1 \times 100 = 742010$; $7420.1 \times 1000 = 7420100$; $7420.1 \times 1000000 = 7420100000$.

(11) $\frac{5.362}{10} = .5362$; $\frac{5.362}{100} = .05362$; $\frac{5.362}{1000000} = .000005362$; $\frac{.3}{10} = .03$; $\frac{.3}{100} = .003$; $\frac{.3}{1000000} = .0000003$

(Continued on next page.)

52008 =
0000000 =
= 20·76854;

= ·030.

= 300·003;

Months =

ths; ·07=

hundred
and three

and five
hundred, and
s, or four

000; 3 ×
00 = 13;
·013 ×
·013 ×
4·0003 ×
4·0003 ×
7420·1 ×
7420·1 ×

=

=

Ex. LV.]

KEY.

101

(11 continued.)

$$\cdot 0000008; \frac{70 \cdot 0107}{10} = 7 \cdot 00107 \cdot \frac{70 \cdot 0107}{100} = \cdot 700107;$$

$$\frac{70 \cdot 0107}{1000000} = \cdot 0000700107; \frac{5000}{10} = 500; \frac{5000}{100} = 50;$$

$$\frac{5000}{1000000} = \cdot 005.$$

$$(12) \frac{2 \cdot 03}{1000000} = \cdot 00000203.$$

Ex. LV. (p. 97.)

$$\begin{array}{r} (1) \\ 1 \cdot 035 \\ \cdot 00643 \\ 27 \cdot \\ 2 \cdot 2146 \\ 530 \cdot 09 \\ \hline 560 \cdot 34603 \end{array}$$

$$\begin{array}{r} (2) \\ 24 \cdot \\ 185 \cdot 3009 \\ \cdot 98795 \\ 3 \cdot 098 \\ \cdot 70006 \\ \hline 214 \cdot 08691 \end{array}$$

$$\begin{array}{r} (3) \\ 186 \cdot 8 \\ 35 \cdot 2779 \\ 9000 \cdot \\ 9 \cdot 201 \\ 830 \cdot 05764 \\ \hline 10061 \cdot 33654 \end{array}$$

$$\begin{array}{r} (4) \\ 94 \cdot 25 \\ \cdot 008 \\ 187 \cdot 96099 \\ 57 \cdot 3916 \\ 5 \cdot 998347 \\ \hline 345 \cdot 608037 \end{array}$$

$$\begin{array}{r} (5) \\ 12 \cdot 5 \\ 20 \cdot 043 \\ 7 \cdot 63201 \\ \cdot 0561 \\ \hline 40 \cdot 23111 \end{array}$$

$$\begin{array}{l} \text{Again } 12 \cdot 5 = 12 \frac{5}{10} = 12 \frac{1}{2} \\ 20 \cdot 043 = 20 \frac{43}{1000} \\ 7 \cdot 63201 = 7 \frac{63201}{100000} \\ \cdot 0561 = \frac{561}{100000} \end{array}$$

$$12 \frac{1}{2} + 20 \frac{43}{1000} + 7 \frac{63201}{100000} + \frac{561}{100000} = 39 +$$

$$\frac{50000 + 4300 + 63201 + 561}{100000} = 39 + \frac{123111}{100000} = 40 \frac{23111}{100000}$$

$$= 40 \cdot 23111.$$

(6)

.0573

$$.0573 = \frac{573}{10000}$$

15

2.04

$$2.04 = 2\frac{4}{100}$$

567.98075

$$567.98075 = 567\frac{98075}{100000}$$

585.07805

$$\begin{aligned} & \frac{573}{10000} + 15 + 2\frac{4}{100} + 567\frac{98075}{100000} = 584 + \\ & \frac{5780 + 4000 + 98075}{100000} = 584\frac{107805}{100000} = 585\frac{7805}{100000} = 585.07805 \end{aligned}$$

(7)

505.0003

$$505.0003 = 505\frac{3}{10000}$$

13.98

$$13.98 = 13\frac{98}{100}$$

5853.097

$$5853.097 = 5853\frac{97}{1000}$$

960

7332.0773

$$\begin{aligned} & 505\frac{3}{10000} + 13\frac{98}{100} + 5853\frac{97}{1000} + 960 = \\ & 7331 + \frac{3 + 9800 + 970}{10000} = 7331\frac{10773}{10000} = 7332\frac{773}{10000} \\ & = 7332.0773. \end{aligned}$$

(8)

6.00734

$$6.00734 = 6\frac{734}{100000}$$

54

15.70087012

$$15.70087012 = 15\frac{70087012}{100000000}$$

8.00003

$$8.00003 = 8\frac{3}{100000}$$

9.987789

$$9.987789 = 9\frac{987789}{1000000}$$

93.69602912

$$\begin{aligned} & 6\frac{734}{100000} + 54 + 15\frac{70087012}{100000000} + 8\frac{3}{100000} + 9\frac{987789}{1000000} = \\ & 92 + \frac{734000 + 70087012 + 3000 + 98778900}{100000000} = 92\frac{169602912}{100000000} \\ & = 93\frac{69602912}{100000000} = 93.69602912. \end{aligned}$$

(9)

18
 7-0003
 408-5
 978-
 0808

$$\begin{aligned} \cdot 13 &= 13 \\ 7 \cdot 0003 &= 7 \\ 408 \cdot 5 &= 408 \\ \cdot 0808 &= 808 \end{aligned}$$

1893-7111

$$\frac{13}{100} + 7\frac{3}{10000} + 408\frac{5}{10} + \frac{808}{10000} + 978 = 1393 + \frac{1300 + 3 + 5000 + 808}{10000} = 1393\frac{7111}{10000} = 1393.7111.$$

Ex. LVI. (p. 98.)

(1)
5.345
8.087

2.258

$$\begin{array}{r} (2) \\ 26.002 \\ 18.9564 \\ \hline 7.0456 \end{array}$$

(3)
15-67
9-7003

5-8697

(4)
21
19-90C9

1-0991

(1) $1.3 \cdot 1.3 = 1.69$ $207 \cdot 207 = 42849$

$$1_{10}^3 - 1_{100}^0 = 1_{100}^1 = 1.17; \quad 207 - 2_{100}^1 = 204_{100}^2 = 204.93.$$

(7) $76:3$ $76:3=76\frac{1}{3}$ $67:5803$ $67:5803=67\frac{5803}{100000}$
 $7:63$ $7:63=7\frac{63}{100}$ $67:3$ $67:3=67\frac{1}{3}$

$$67_{10000}^{2803} - 67_{10}^1 = 10000 = 2803;$$

(3) 501
428-90456

428-90456 = 428-90456

$$501-428,888888=72,888888=72,09544;$$

(Continued on next page.)

(5 Continued.)

5324

53.24

5270.76

⁽¹⁾ 4.42.00043

4.41958

.007.0000007.0069993

53.24 = 53.24

5324 - 53.24 = 5270.76 = 5270.76;

4.42 = 4.42

.00042 = 100000

4.42 - 100000 = 4.41958 = 4.41958

.007 = 1000.0000007 = 10000000

1000 - 10000000 = 10000000 = .0069993.

⁽¹⁾ 2.3.23

2.07

⁽⁶⁾⁽²⁾ 23.2.07

20.93

⁽¹⁾ .1.005

.095

⁽⁷⁾⁽²⁾ 20.009.029

19.980

⁽⁸⁾

.7

.087

.618

1.2

.12

.012

210.

211.832⁽⁹⁾

.332 = 1000, 1 - 1000 =

1000 = 1000.

⁽¹⁰⁾⁽¹⁾ 31.253.059

28.191

235.6758

263.8668

184.0003

79.8665

⁽²⁾ 215.2636.9504

208.3126

125.3807

82.9319

7.0004

.05

3.9504

45.08 1

80.3007

125.3807

EX. LVII. (p. 98.)

(1)

3.25

.85

1625

975

1.1875

(2)

6.085

2.7

42245

12070

16.2945

(3)

40.004

2.03

120012

80008

81.20812

(4)

980.35

.0049

612815

272140

3.333715

(5)

20607

20607

144249

123642

41214

4246.48449

57.068

2.004

228272

114136

114.364272,

5.36

700

3752.00,

7.01509

50.805

3507545

5612072

3507545

356.40164745

(6)

60.70

11

667.81,

60.71

100

$$\times 11 = \frac{66781}{100} = 667.81;$$

$$60.71 = 60.71;$$

$$57.068 \times 2.004 = \frac{57068}{1000} \times \frac{2004}{1000} = \frac{11436272}{1000000} = 114.364272;$$

$$5.36 \times 700 = \frac{536}{100} \times \frac{700}{100} = 6752;$$

$$7.01509 \times 50.805 = \frac{701509}{100000} \times \frac{50805}{1000} = \frac{35640164745}{100000000} = 356.40164745.$$

48·067
·00037

(7)

886469
144201

$$48·067 \times ·00037 = \frac{48067}{1000} \times \frac{37}{100000} = \frac{1778479}{10000000} = ·01778479;$$

·01778479,

54·3047
9·00005

2715235

4887423

$$54·3047 \times 9·00005 = \frac{543047}{10000} \times \frac{900005}{1000000} = \frac{488745015235}{10000000000} = 488·745015235;$$

488·745015235,

2·568
·00025

12840
5186

$$2·568 \times ·00025 = \frac{2568}{10000} \times \frac{25}{100000} = \frac{642}{1000000} = ·000642.$$

·00064200 = ·000642

(8)

(1) 5·5
·055

275
275

·3025
550

151250
15125

$$5·5 \times ·055 \times 550 \times ·0055 = \frac{55}{10000} \times \frac{55}{10000} \times \frac{550}{10000} \times \frac{55}{10000} = \frac{9150625}{100000000} = ·9150625;$$

168·3750
·0055

881875
881875

·9150625,

(Continued on next page.)

(8 continued.)

(7) 1.75

6.2

$$1.75 \times 6.2 \times 85 \times .0004 = \frac{175}{1000} \times \frac{62}{10} \times \frac{85}{1} \times \frac{4}{10000} = \frac{3689}{10000} = .3689.$$

850

1050

10850

85

5425

8680

922.25

.0004

$$.368900 = .3689.$$

(9)

37.85

7.35

18925

11855

26495

278.1975 yds.

(10)

365

95

1825

3285

346.75 =

346½ loaves.

Ex. LVIII. (p. 100.)

(1)

(27) 33.372 (12.36

27

63

54

97

81

162

162

$$33.372 + 2.7 = \frac{33372}{1000} \times \frac{1}{10} = \frac{1236}{100} = 12.36.$$

(27) 33372 (1.236

(2)

$$33372 \div 27 = \frac{33372}{100000} \times \frac{100}{27} = \frac{1236}{100} = 1.236.$$

(27) 33372 (.01236

(3)

$$33372 \div 27 = \frac{33372}{1000000} \times \frac{1}{27} = \frac{1236}{100000} = .01236.$$

(27) 33372.00 (123600

(4)

$$33372 \div 27 = \frac{33372}{10000000} \times \frac{100}{27} = \frac{123600}{1000000} = 123600.$$

$$\begin{array}{l} (5) \\ \cdot 00027) 33372 \cdot 00000 \quad (123000000) \quad 33372 + \cdot 00027 = \\ \underline{33372} \times 100000 = 123000000. \end{array}$$

$$\begin{array}{l} (6) \\ \cdot 323) 561 \cdot 0833 \quad (1737 \cdot 1) \\ \underline{323} \end{array}$$

2380

2261

1198

969

2293

2261

323

323

$$561 \cdot 0833 + \cdot 323 = \frac{5610833}{10000} \times \frac{1000}{323} = \frac{17371}{10} = 1737 \cdot 1.$$

$$\begin{array}{l} (7) \\ \cdot 323) 5610833 \cdot 000 \quad (17371000) \quad 5610833 + \cdot 323 = \frac{5610833}{100} \\ \quad \quad \quad = \frac{1000}{323} = 17371000. \end{array}$$

$$\begin{array}{l} (8) \\ 3 \cdot 23) 56108 \cdot 33 \quad (17371) \quad 56108 \cdot 33 + \cdot 3 \cdot 23 = \frac{5610833}{100} \times \frac{100}{323} = \frac{5610833}{323} = 17371. \end{array}$$

$$\begin{array}{l} (9) \\ \cdot 0000323) 5610 \cdot 8330000 \quad (173710000) \quad 5610 \cdot 833 + \\ \quad \quad \quad \cdot 0000323 = \frac{5610833}{10000} \times \frac{1000000}{323} = 173710000. \end{array}$$

$$\begin{array}{l} (10) \\ 3 \cdot 25) 552 \cdot 5325 \quad (170 \cdot 01) \\ \underline{325} \end{array}$$

2275

2275

$$552 \cdot 5325 + 3 \cdot 25 = \frac{5525325}{10000} \times \frac{100}{325} = \frac{17001}{10} = 1700 \cdot 1;$$

325

325

(14)

$$11) \cdot 121 \text{ (} \cdot 011 \text{)} \quad \cdot 121 \div 11 = \frac{121}{11} \times \frac{1}{11} = \cdot 011;$$

$$1100) \cdot 12100 \text{ (} \cdot 00011 \text{)} \quad \cdot 121 \div 1100 = \frac{121}{1100} \times \frac{1}{1100} = \frac{11}{100000} = \cdot 00011;$$

$$\cdot 0011) \cdot 1210000 \text{ (} 110 \text{)} \quad \cdot 121 \div \cdot 0011 = \frac{121}{11000} \times \frac{10000}{11} = 110.$$

(15)

$$\cdot 000193) 393 \cdot 7200 \text{ (} 2040000 \text{)}$$

$$\begin{array}{r} 393 \\ \hline 772 \\ \hline 772 \\ \hline \end{array}$$

$$393 \cdot 72 \div \cdot 000193 = \frac{39372}{100} \times \frac{1000000}{193} = 2040000;$$

$$1 \cdot 93) 393 \cdot 72 \text{ (} 204 \text{)} \quad 393 \cdot 72 \div 1 \cdot 93 = \frac{39372}{100} \times \frac{100}{193} = 204;$$

$$193000) 393 \cdot 72000 \text{ (} \cdot 00204 \text{)} \quad 393 \cdot 72 \div 193000 = \frac{39372}{100} \times \frac{1}{193000} = \frac{204}{100000} = \cdot 00204.$$

(16)

$$\cdot 03275) 590 \cdot 48250 \text{ (} 18030 \text{)}$$

$$\begin{array}{r} 5904825 \\ \hline 26298 \\ \hline 26200 \\ \hline \end{array}$$

$$590 \cdot 4825 \div \cdot 03275 = \frac{5904825}{100000} \times \frac{100000}{3275} = 18030;$$

$$\begin{array}{r} 9825 \\ \hline 9825 \\ \hline \end{array}$$

$$327500) 590 \cdot 4825000 \text{ (} \cdot 001803 \text{)} \quad 590 \cdot 4825 \div 327500 = \frac{5904825}{100000} \times \frac{1}{327500} = \frac{1803}{1000000} = \cdot 001803.$$

(17)

$$1\cdot00103) 213\cdot419596 (213\cdot2$$

200206

132185

100103

320329

300309

200206

200206

$$213\cdot419596 + 1\cdot00103 = 213\cdot419596$$

$$\times 1000000 = 213\cdot2 = 213\cdot2;$$

$$100103) 213\cdot419596 (002132$$

$$213\cdot419596 + 100103 =$$

$$213419596 \times 100103 = 1000000 = 002132,$$

(18)

0024

24

$$24) 2424 (0101$$

24

24

24

(19)

$$25) 000200 (0008$$

200

(20)

$$1\cdot75) 21\cdot875 (12\cdot5 \text{ days,}$$

175 or $12\frac{1}{2}$ days.

437

850

875

875

(21)

$$75) 64\cdot125 (85\cdot5 \text{ times,}$$

600 or $85\frac{1}{2}$ times.

413

375

375

375

(22)

$$023) 00070242 (93054$$

69

124

115

92

92

Ex. LIX. (p. 101.)

(1)

$$\begin{array}{r} 3) 1.9000(6.333 \\ 18 \\ \hline 10 \\ 9 \\ \hline 10 \end{array} \quad 1.9 \div .3 = \frac{19}{10} \times \frac{10}{3} = \frac{19}{3} \times \frac{10}{10} = \frac{1900}{300} \times \frac{10}{10} = \frac{19000}{3000} = \frac{6333}{1000} = 6.333;$$

$$\begin{array}{r} .03) 1.90000(63.333 \\ 18 \\ \hline 10 \\ 9 \\ \hline 10 \end{array} \quad 1.9 \div .03 = \frac{19}{10} \times \frac{100}{3} = \frac{19}{3} \times \frac{100}{10} = \frac{19000}{300} \times \frac{10}{10} = \frac{190000}{3000} = \frac{63333}{1000} = 63.333;$$

$$\begin{array}{r} 300) 1.900(.00633 \\ 18 \\ \hline 10 \\ 9 \\ \hline 10 \end{array} \quad 1.9 \div 300 = \frac{19}{10} \times \frac{1}{300} = \frac{19}{300} \times \frac{1}{10} = \frac{1900}{3000} \times \frac{1}{1000} = \frac{1900}{3000000} = \frac{633}{1000000} = .00633, \text{ or } .006.$$

(2)

$$\begin{array}{r} 159) 4.937(.031 \\ 577 \\ \hline 167 \\ 159 \end{array} \quad 4.936 \div 159 = \frac{4937}{1000} \times \frac{1}{159} = \frac{4937}{159} \times \frac{1}{1000} = \frac{31}{1000} = .031;$$

$$\begin{array}{r} 1.59) 4.93700(3.105 \\ 477 \\ \hline 167 \\ 159 \end{array} \quad 4.937 \div 1.59 = \frac{4937}{1000} \times \frac{100}{159} = \frac{4937}{159} \times \frac{100}{1000} = \frac{3105}{1000} = 3.105;$$

$$\begin{array}{r} 167 \\ 159 \\ \hline 800 \\ 795 \end{array}$$

$$\begin{array}{r} 1590) 4.937(.003 \\ 477 \\ \hline 167 \\ 159 \end{array} \quad 4.937 \div 1590 = \frac{4937}{1000} \times \frac{1}{1590} = \frac{4937}{1590} \times \frac{1}{1000} = \frac{3}{1000} = .003.$$

(3)

53) 329744·000 (6221·584

318

$$329744 \div 53 = 6221.584 \times \frac{1000}{1000} = 6221584;$$

117

106

114

106

84

53

310

310

265

450

424

260

212

$$0053) 329744 \cdot 0000000 (62215849 \cdot 056, \\ 329744 \div 0053 = 3297440000000 \times \frac{1}{5300} = 62215849056 \\ = 62215849 \cdot 056;$$

$$5300) 329744 (62 \cdot 215, \quad 329744 \div 5300 = 6221.110 \times \frac{1}{1000} \\ = 6221.5 = 62 \cdot 215.$$

Ex. LX. (p. 102.)

(1)

$$\frac{4|1 \cdot 00}{\cdot 25}; \frac{5|3 \cdot 0}{\cdot 6}; \frac{4|6 \cdot 0}{1 \cdot 5}; \frac{5|1 \cdot 0}{\cdot 2} \therefore \text{Ans.} = 6 \cdot 2; \quad \frac{5|39 \cdot 0}{7 \cdot 8}$$

$$\frac{8|5 \cdot 000}{\cdot 625}; \frac{10|3 \cdot 0}{\cdot 3} \therefore \text{Ans.} = 5 \cdot 3.$$

(2)

$$16 \left\{ \begin{array}{l} 4 \\ 4 \end{array} \middle| \begin{array}{l} 3 \cdot 00 \\ \cdot 7500; \\ \cdot 1875 \end{array} \right. \quad 16 \left\{ \begin{array}{l} 4 \\ 4 \end{array} \middle| \begin{array}{l} 15 \cdot 00 \\ 3 \cdot 7500; \\ \cdot 9375 \end{array} \right. \therefore \text{Ans.} = 8 \cdot 9375;$$

$$20 \left\{ \begin{array}{l} 5 \\ 4 \end{array} \middle| \begin{array}{l} 19 \cdot 0 \\ 3 \cdot 80; \\ \cdot 95 \end{array} \right. \quad 32 \left\{ \begin{array}{l} 4 \\ 8 \end{array} \middle| \begin{array}{l} 31 \cdot 00 \\ 7 \cdot 75000; \\ \cdot 96875 \end{array} \right. \quad 40 \left\{ \begin{array}{l} 8 \\ 5 \end{array} \middle| \begin{array}{l} 37 \cdot 000 \\ 4 \cdot 625 \\ \cdot 925 \end{array} \right.$$

$$\therefore \text{Ans.} = 7.925.$$

(3)

$$50 \left\{ \begin{array}{r|l} 5 & 47.0 \\ 10 & 9.40 \\ \hline & .94 \end{array} \right.$$

$$125 \left\{ \begin{array}{r|l} 5 & 7.0 \\ 5 & 1.40 \\ 5 & .280 \\ \hline & .056 \end{array} \right.$$

 $\therefore \text{Ans.} = 4.056;$

$$500 \left\{ \begin{array}{r|l} 10 & 3.0 \\ 10 & .30 \\ 5 & .030 \\ \hline & .006; \end{array} \right.$$

$$625 \left\{ \begin{array}{r|l} 5 & 99.00 \\ 5 & 19.80 \\ 5 & 3.960 \\ 5 & .7920 \\ \hline & .1584; \end{array} \right.$$

$$1024 \left\{ \begin{array}{r|l} 8 & 3.000 \\ 8 & .375000 \\ 8 & .046875000 \\ 2 & .0058593750 \\ \hline & .0029296875 \end{array} \right.$$

 $\therefore \text{Ans.} = 84.0029296875.$

(4)

$$\frac{2}{3} \text{ of } 1\frac{1}{6} = 1\frac{2}{3},$$

$$128 \left\{ \begin{array}{r|l} 4 & 65.00 \\ 4 & 16.2500 \\ 8 & 4.0625000 \\ \hline & .5078125; \end{array} \right.$$

$$3\frac{1}{2} \text{ of } 2\frac{1}{2} = 8\frac{1}{2},$$

$$4 \overline{) 3.00} \\ \underline{.75}$$

 $\therefore \text{Ans.} = 8.75;$

$$3\frac{1}{2} \text{ of } 4\frac{1}{2} \text{ of } 5\frac{1}{2} = 76\frac{1}{4},$$

$$64 \left\{ \begin{array}{r|l} 8 & 15.000 \\ 8 & 1.875000 \\ \hline & .234375 \end{array} \right. \quad \therefore \text{Ans.} = 76.234375.$$

(5)

$$1\frac{1}{2} - 1\frac{1}{6} + 3\frac{5}{6},$$

$$5 \overline{) 3.0} \\ \underline{.6}$$

 $\therefore 1\frac{1}{2} = 1.6;$

$$1.6 - .8125 = .7875$$

$$.7875 + 3.125 = 3.9125,$$

$$16 \left\{ \begin{array}{r|l} 4 & 13.0 \\ 4 & 3.25 \\ \hline & .8125 \end{array} \right.$$

 $\therefore 1\frac{1}{2} = .8125;$

(Continued on next page.)

(3 continued.)

$$40 \left\{ \begin{array}{l} 5 \\ 8 \end{array} \right| \begin{array}{l} 5 \\ 1.000 \\ \hline .125 \end{array} \quad \therefore 3\frac{5}{8} = 3.125;$$

$$11\frac{1}{2} + .75 \text{ of } 3\frac{1}{2} \text{ of } 6\frac{1}{2} = 11.5 + .75 \text{ of } \frac{13}{2} = 11.5 + .75 \times 6\frac{1}{2} = 11.5 + .75 \times 6.48 = 11.5 + 4.86 = 16.36.$$

Ex. LXI. (p. 104.)

$$\begin{array}{l} (1) \\ 3 \overline{)2.0} \quad 9 \overline{)1.0} \quad 7 \overline{)6.0} \quad 12 \overline{)7.0} \quad 15 \left\{ \begin{array}{l} 5 \\ 3 \end{array} \right| \begin{array}{l} 11.0 \\ 2.2 \\ \hline .73. \end{array} \end{array}$$

$$(2) \\ 81 \left\{ \begin{array}{l} 9 \\ 9 \end{array} \right| \begin{array}{l} 3. \\ \hline 33333 \\ \hline .037 \end{array} \quad \therefore \text{Ans.} = 6.037; \quad 37 \overline{)5.0} (.135)$$

$$44 \left\{ \begin{array}{l} 4 \\ 11 \end{array} \right| \begin{array}{l} 7.00 \\ \hline 1.75 \\ \hline .1590 \end{array} \quad \therefore \text{Ans.} = 100.1590; \quad \begin{array}{r} 130 \\ 111 \\ \hline 190 \\ 185 \\ \hline 50 \end{array} \quad \therefore \text{Ans.} = 7.135;$$

$$17) 15.0 (.8823529411764705 \\ 136$$

$\therefore \text{Ans.} =$

$$2.8823529411764705.$$

140	50	30	
136	34	17	120
			119
40	160	130	
34	153	119	100
			85
60	70	110	
51	68	102	150
			136
90	20	80	
85	17	08	

(3)

$$495 \left\{ \begin{array}{r|l} 5 & 67.0 \\ 9 & 13.4 \\ 11 & 1.489 \\ \hline & .135 \end{array} \right.$$

$$\therefore \text{Ans.} = 11.135;$$

$$1375 \left\{ \begin{array}{r|l} 5 & 17.0 \\ 5 & 3.40 \\ 5 & .680 \\ 11 & .136 \\ \hline & .01236 \end{array} \right.$$

$$\therefore \text{Ans.} = 23.01236.$$

(4)

$$\begin{aligned} .2 &= \frac{2}{10}; .05 = \frac{5}{100}; .18 = \frac{18}{100} = \frac{9}{50}; .156 = \frac{156}{1000} = \frac{39}{250} = \\ &= \frac{39}{250}; .027027 = \frac{27027}{1000000} = \frac{27}{1000}; \\ .285714 &= \frac{285714}{1000000} = \frac{2}{7}. \end{aligned}$$

(5)

$$\begin{aligned} .566 &= \frac{566}{1000} = \frac{283}{500} = \frac{17}{250}; .743 = \frac{743}{1000} = \frac{743}{1000} = \frac{743}{1000}; \\ .20235 &= \frac{20235}{100000} = \frac{4047}{20000}; 19.305 = 19\frac{305}{1000} = 19\frac{61}{200} = 19\frac{7}{20} \\ &= 19\frac{7}{20}; 20.02916 = 20\frac{2916}{100000} = 20\frac{2916}{100000} = 20\frac{7}{20}. \end{aligned}$$

(6)

$$\begin{aligned} 6.18153153 &= 6.18153 = 6\frac{18153}{100000} = 6\frac{18153}{100000} = 6\frac{18153}{100000}; \\ 15.692307692307 &= 15.692307 = 15\frac{692307}{100000} = 15\frac{692307}{100000}. \end{aligned}$$

(7)

$$\begin{array}{r} 4.3333333 \\ 16.4545454 \\ 75.7352352 \\ \hline \end{array}$$

$$96.5231139$$

$$\therefore \text{Ans.} = 96.523114.$$

(9)

$$\begin{array}{r} 3.8564646 \\ 2.0387777 \\ \hline \end{array}$$

$$1.8176869$$

$$\therefore \text{Ans.} = 1.817686.$$

(8)

$$\begin{array}{r} 8.2333333 \\ 26.7967967 \\ 7.4134134 \\ \hline \end{array}$$

$$37.4435434$$

$$\therefore \text{Ans.} = 37.443543.$$

(10)

$$\begin{array}{r} 52.8666666 \\ 8.3723572 \\ \hline \end{array}$$

$$44.4943094$$

$$\therefore \text{Ans.} = 44.494309.$$

(11)

$$\begin{aligned} 7.6 + 5.3 &= 7\frac{2}{3} + 5\frac{1}{2} = 40\frac{7}{6} = 40\frac{7}{6}; 351 \times 736 = 341 \times 736 \\ &= \frac{1}{3} \times \frac{1}{10} = \frac{1043}{2587223}; 13 \times 2 \times 4 = \frac{1}{2} \times \frac{1}{2} \\ &\times \frac{1}{2} = \frac{1}{8} \times \frac{1}{8} + \frac{1}{8} = \frac{1}{875} = .01185. \end{aligned}$$

(12)

$$\begin{aligned}
 6\cdot7 + 2\cdot6 &= 6\frac{7}{8} + 2\frac{6}{8} = \frac{61}{8} \times \frac{8}{8} = \frac{61}{1} = 2\frac{1}{2} = 2\cdot5416; \cdot2627 \\
 + 1\cdot926 &= \frac{2627}{9900} + \frac{1926}{9900} = \frac{3553}{9900} = \frac{3553}{1100} + \\
 \frac{300}{1734} &= \frac{3553}{19074} = \cdot136; \cdot371 + 5 = \frac{371}{990} + 5 = \frac{371}{990} + 5 \\
 &= \frac{147}{47} = \cdot0743; 42\cdot0463 + 136 = 42\frac{163}{10000} + 136 = \\
 &42\frac{163}{10000} \times \frac{11}{11} = \frac{4633082}{100000} = 30\cdot833953.
 \end{aligned}$$

Ex. LXII. (p. 105.)

(1)

$$\begin{array}{r}
 \cdot75 \\
 \underline{100} \\
 75\cdot00 \text{ cts.} \\
 \text{Ans. 75 cts.}
 \end{array}$$

(2)

$$\begin{array}{r}
 \cdot875 \\
 \underline{5} \\
 \$4\cdot375 \\
 \underline{100} \\
 37\cdot500 \text{ cts.}
 \end{array}$$

(3)

$$\begin{array}{r}
 \cdot625 \\
 \underline{100} \\
 62\cdot500 \text{ cts.} \\
 \text{Ans. 62\frac{1}{2} cts.}
 \end{array}$$

$$37\cdot500 \text{ cts.} \quad \text{Ans. } \$4\cdot37\frac{1}{2} \text{ cts.}$$

(4)

$$\begin{array}{r}
 \cdot625 \text{ cwt.} \\
 \underline{4} \\
 2\cdot500 \text{ qrs.} \\
 \underline{25} \\
 2500 \\
 \underline{1000} \\
 12\cdot500 \text{ lbs.} \\
 \underline{16} \\
 3000 \\
 \underline{500} \\
 8\cdot000 \text{ oz.}
 \end{array}$$

(5)

$$\begin{array}{r}
 \cdot375 \\
 \underline{8} \\
 3\cdot000 \text{ fur.} \\
 \text{Ans. 3 fur.}
 \end{array}$$

(6)

$$\begin{array}{r}
 \cdot175 \\
 \underline{20} \\
 3\cdot500 \text{ cwt.} \\
 \underline{4} \\
 2\cdot000 \text{ qrs.} \\
 \text{Ans. 3 cwt. 2 qrs.}
 \end{array}$$

$$\begin{array}{r}
 12\cdot500 \text{ lbs.} \\
 \underline{16}
 \end{array}$$

$$\begin{array}{r}
 3000 \\
 \underline{500}
 \end{array}$$

$$8\cdot000 \text{ oz.} \quad \text{Ans. 2 qrs. 12 lbs. 8 oz.}$$

(7)
 46875
 50

23 43750s.
 12

5 25000d.
 4

1 00000q. Ans. 23s. 5½d.

(10)
 4 65 × 4 a. 2 ro.
 4 65
 18

3720
 465

83 70 ro.
 40

28 00 per.
 Ans. 83 ro. 28 per., or 20 a. 3 ro. 28 per.

(12)
 2 56
 525

1280
 512
 1280

1344 00 qrs.
 Ans. 1344 qrs., or £1 8s.

(8)
 0625
 90

5 6250d.
 4

2 5000q.

Ans. 5½d. 5q. Ans. 2 lbs. 2 oz. 2 dwt.

(9)
 175
 12

2 100 oz.
 20

2 000 dwt.

(11)
 10 04
 100

1004 00 per.
 Ans. 1004 per., or 6 a. 1 ro. 4 per.

(13)
 5 00875
 25

2504375
 1001750

125 21875 dys.
 24

87500
 43750

5 25000 hrs.
 60

Ans. 125 dys. 5 hrs. 15 min.,
 or 17 wks. 6 dys. 5 hrs. 15 min. 15 00000 min.

z.

wt.
dwt.

per.

(14)
504
24

2016
1008

12·096 hrs.
60

5·760 min.
60

45·600 sec.

Ans. 12 dys. 12 hrs. 5 min. 45·6 sec.

(16)
£4 1s. = 81s.
3·0085
81

30085
240680

243·6885s.
12

8·2620d.
4

1·0480q.

Ans. 243s. 8d. 1·048q. or
£12 3s. 8½d. 048q.

(15)
5 lbs. 2 sc. = 1442 sc.
3·05

7210
4326

4398·10
20

2·00 grs.

Ans. 4398 sc. 2 grs., or 15 lbs.
3 oz. 2 drs. 2 grs.

(17)
1 ac. 3 ro. 5 po. = 285 po.
7·034
585

35170
56272
14068

2004·690 per.
30½

20700
1725

20·8725 yds.
9

7·8525 ft.
144

34100
34100
8525

Ans. 2004 po. 20 yds. 7 ft. 122·76 in.
or 12 a. 2 ro. 4 po. 20 yds.
7 ft. 122·76 in.

122·7600 in.

(18)

16 lbs. 1 oz. 6 grs. = 92646 grs.

92646

5005

463230

463230

463693·230 grs.,

or 80 lbs. 6 oz. 13·23 grs.

(19) $\frac{3}{4}$ of \$2 = $\frac{3}{4}$ or $\frac{1}{4}$ of \$2 = 66 $\frac{3}{4}$ cts.(20) $\frac{5}{8}$ of 16s. 6d. = $\frac{5}{8}$ of 198d. = 108d. = 9s.(21) $\frac{2}{3}$ of a ton = $\frac{2 \times 2000 \times 16}{3}$ of 20 cwt. = $\frac{3}{4}$ of 20 cwt.
= $\frac{7}{8}$ of 20 cwt. = 4 cwt. 3 qrs. 11 lbs. 10 oz. 10 $\frac{1}{2}$ drs.(22) $\frac{6}{8}$ of £5 = $\frac{3}{4}$ of £5 = $\frac{6}{8}$ of £5 = $\frac{3}{4}$ of £5
= £34 $\frac{1}{2}$ = £34 8s. 4d.(23) $\frac{2}{3}$ of 2 $\frac{1}{2}$ lbs. = $\frac{2 \times 2 \frac{1}{2} \times 16}{3}$ of 2 $\frac{1}{2}$ lbs. = $\frac{2}{3}$ of 2 $\frac{1}{2}$ lbs.
= $\frac{2}{3}$ of 2 lbs. 6 oz. = $\frac{2}{3}$ of 30 oz. = 71 $\frac{1}{2}$ oz. = 5 lbs.
11 oz. 10 dwt.(24) $\frac{6}{8}$ of a c. yd. = $\frac{3}{4}$ of 27 c. ft. = 168 c. ft. = 6 c.
yds. 6 c. ft.(25) $\frac{18}{72}$ of an ac. = $\frac{18}{72}$ ac. = $\frac{1}{4}$ ac. = 13 ac. 2 ro.
36 po. 11 yds.(26) $\frac{2}{1000}$ of 1000 guineas = $\frac{2 \times 1000 \times 20}{1000}$ of 1000 gs. = $\frac{2}{1000}$
of 1000 gs. = $\frac{2 \times 1000}{1000}$ of 1000 gs. = 2006 $\frac{1}{2}$ gs. = 2006 gs. 7s.
= £2166 10s.

(27) £634875

·025

3·16 of 30s. = 3 $\frac{1}{5}$

30

25

of 30s. = 3 $\frac{1}{5}$ of 30s.

= 95s. = £4 15s.

12·687500s.

125

12

50

8.250000d.

625s.

4

12

1·000000q.

7·500d.

4

2·000

 $\therefore$ value req^d = 12s. 8 $\frac{1}{2}$ d. + 7 $\frac{1}{2}$ d + £4 15 = £5 8s. 3 $\frac{1}{2}$ d.

(28) $\frac{1}{6}$ of an ac. = $\frac{1}{4}$ ac. = $\frac{1}{2}$ ac. = 2 ro. 26 po. 20 yds.
1 ft. 72 in.; 625 of a ro. = 625 of 40 po. = 25 po. $\frac{1}{4}$ po.
= $\frac{1}{4}$ of 304 yds. = 11 yds.

2 ro. 26 po. 20 yds. 1 ft. 72 in. + 25 po. 11 yds. = 3 ro.
11 po. 9 yds. 1 ft. 72 in.

(29) 6714285 of 1s. 9d. = 6714285 of 21d. = 67 of 21d.
= 141d. = 11s. 9d.; 0833 of £7 4s. = $\frac{233}{1000}$ of 144s. =
 $\frac{750}{1000}$ of 144s. = $\frac{1}{2}$ of 144s. = 12s.; 251190476 of 6s. 8d.
= $\frac{251190476}{1000000000}$ of 80d. = $\frac{331133333}{1000000000}$ of 80d. = $\frac{1}{3}$ of
80d. = 1s. 8 $\frac{1}{3}$ d.

$\therefore$ value req^d = 11s. 9d. - 12s. + 1s. 8 $\frac{1}{3}$ d. = 1s. 5 $\frac{1}{3}$ d.

Ex. LXIII. (p. 106.)

(1)

1 qr. 5 lbs. = 30 lbs.
1 cwt. = 4 $\times$ 25 = 100 lbs.
 $\therefore$ fr. req^d is $\frac{30}{100}$ or $\frac{3}{10}$ = 3.

or thus:

25 $\overline{) 5}$
4 $\overline{) 12}$
3

(2)

\$2.50 = 250 cts.
\$16 = 1000 cts.
 $\therefore$ fr. req^d = $\frac{250}{1000}$ =
 $\frac{1}{4}$ = 25.

(3)

60 $\overline{) 30}$
24 $\overline{) 35}$
14583

(4)

40 $\overline{) 11}$
4 $\overline{) 3275}$
8175

(5)

4 $\overline{) 2}$
12 $\overline{) 65}$
5416

(6) 2 fur. = (2 $\times$ 40 $\times$ 5 $\frac{1}{2}$ $\times$ 3 $\times$ 12) in. = 15840 in.

$\therefore$ fr. req^d is $\frac{3}{10}$ of 15840 = 4752 = 00022095.

(7) 2 oz. 13 dwt. = 53 dwt.; 1 lb. = 240 dwt.

$\therefore$ fr. req^d = $\frac{53}{240}$ = 22083.

(8) 4 lbs. 2 sc. = 1154 sc.; 1 oz. = 24 sc.

$\therefore$ fr. req^d = $\frac{1154}{24}$ = 48.083.

(9)

144 $\left\{ \begin{array}{l} 12 \overline{) 73} \\ 12 \overline{) 608333} \\ 9 \overline{) 2506944} \\ \hline 2785493837160 \end{array} \right.$

(10)

1 lb. Troy = 5760 grs.
1 lb. Avoir. = 7000 grs.
 $\frac{5760}{7000}$ = 82285714.

$$\begin{array}{r} (11) \\ 12 \overline{) 9} \\ 20 \overline{) 10.75} \\ \hline 5875 \end{array}$$

$$\begin{array}{r} (12) \\ 12 \overline{) 7} \\ 20 \overline{) 17.5833} \\ \hline 87916 \end{array}$$

(13) 2 wks $6\frac{1}{2}$ dys. = 486 hrs.; 4 dys. 3 hrs. = 99 hrs.

$\therefore$ fr. req^d = $4\frac{86}{99} = 4.90$.

(14) 2 lbs. 14 oz. = 46 oz.; 18 lbs. = 288 oz.

$\therefore$ fr. req^d = $2\frac{46}{288} = 1\frac{23}{144} = 1.5972$.

Ex. LXIV. (p. 107.)

PAPER I.

(3)

(¹) 1018269
20979
100001050
54000003000
400000006
999990

(²) 400001
300725

99276

54502043294

(4)

268936785
5689

2420431065
2151494280
1613620710
1344683925

268936785) 1529981369865 (5689
1344683925

1852974448
1613620710

2393587386
2151494280

2420431065
2420431065

Multiplication may be proved by division and *visa versa*.

(5)
6974) 27027027027 (3875398

20922

61050
55792

52582
48818

87647
34870

27770
20922

68482
62766

57167
55792

1875

(6)

mi. fur. per.
12 2 6
8

98

40

3926

5½

19630

1963

21593

3

64779

12

777348

3875398

6974

15501592

37127786

34878582

23252388

27027025652

1875

27027027027

12 | 777348 in.

3 | 64779 ft.

21593 yds.

5½ | 2

11 | 43186

40 | 3926 per.

8 | 98·6 per.

12·2 fur.

12 mi. 2 fur. 6 per.

PAPER II.

(1)

$$\begin{array}{r|rrrr}
 2 & 27 & 36 & 42 & 48 \\
 2 & 27 & 18 & 21 & 24 \\
 3 & 27 & 9 & 21 & 12 \\
 \hline
 & 9 & 3 & 7 & 4
 \end{array}$$

$$\text{L. C. M.} = 2 \times 2 \times 3 \times 9 \times 7 \\ \times 4 = 3024.$$

$$\begin{array}{r|rrrrr}
 3 & 2 & 3^{(3)} & 5 & 6 & 9 \\
 \hline
 & & & 5 & 2 & 3
 \end{array}$$

$$\text{L. C. M.} = 3 \times 5 \times 2 \times 3 = 90.$$

(4)

$$\begin{array}{r|rr}
 2 & 8 & 14 \\
 \hline
 & 4 & 7
 \end{array}$$

$$\text{L. C. M.} = 2 \times 4 \times 7 = 56; \quad 1000 \div 56 = 17\frac{8}{7}.$$

 $\therefore$ Ans. 17 times.

(5)

$$(^1) 126\frac{1}{2} + 40\frac{1}{2} + 10\frac{1}{2} + 11\frac{1}{2} + 50\frac{1}{2} = 239\frac{1}{2} \text{ miles.}$$

$$(^2) 4380000$$

$$8550000$$

$$1500000$$

$$550000$$

$$7000000$$

$$560000$$

$$\hline \$22540000$$

$$957) 87920000 \quad (91870.42$$

$$8613$$

$$\hline 1790$$

$$957$$

$$\hline 8330$$

$$7656$$

$$\hline 6740$$

$$6699$$

$$(^3) \$22540000 - \$560000 =$$

$$\$21980000; \quad \$21980000 \div$$

$$239\frac{1}{2} = 87920000 \div 957 =$$

$$\$91870.42 \text{ and } \$8.06 \text{ over. } \dagger$$

$$\hline 4100$$

$$3828$$

$$\hline 2720$$

$$2720$$

$$1914$$

$$\hline 803$$

$$\begin{array}{r} 9 \\ \hline 3 \\ 90. \end{array}$$

162

$ \begin{array}{r} 27 \times 4 = \$108.00 \\ 6 \times 20 = 1.20 \\ 9\frac{1}{2} \times 4 \times 5 \div 12 = .15\frac{1}{2} \\ \hline \$109.35\frac{1}{2} \\ \\ 3 \times 4 = \$12.00 \\ 12 \times 20 = 2.40 \\ 7 \times 4 \times 5 \div 12 = .11\frac{1}{2} \\ \hline \$14.51\frac{1}{2} \end{array} $	(4)	$ \begin{array}{r} 19 \times 4 = \$76.00 \\ 5 \times 20 = 1.00 \\ 8 \times 4 \times 5 \div 12 = .13\frac{1}{2} \\ \hline \$77.13\frac{1}{2} \\ \\ \$109.35\frac{1}{2} \\ \$ 17.22 \\ \$ 77.13\frac{1}{2} \\ \$198.05 \\ \$ 14.51\frac{1}{2} \\ \hline \$416.27\frac{1}{2} \end{array} $
---	-------	---

(5) $.875 = \frac{7}{8}$; $21 = \frac{7}{8}$ of the larger side, or $\frac{1}{8} = 3$ and $\frac{7}{8}$ of the whole = 24; $21 + 24 = 45 =$ whole number of players, which is equal to $.625$ or $\frac{5}{8}$ of the onlookers; if $\frac{5}{8} = 45$, $\frac{1}{8} = 45 \div 5 = 9$, and $\frac{7}{8}$ of the whole = $9 \times 8 = 72$.

(6) $.014$ of $1\frac{1}{2}$ of $\frac{1\frac{1}{2}}{5\frac{1}{2}}$ of $\frac{1}{4}$ of $4\frac{1}{2}$ of $\frac{\frac{3}{4} + \frac{1}{2}}{\frac{3}{4} - \frac{1}{2}}$ of $71\frac{1}{2} = \frac{11}{1000}$

of $\frac{7}{8}$ of $\frac{\frac{6}{7}}{2\frac{7}{8}}$ of $\frac{7}{8}$ of $4\frac{1}{2}$ of $\frac{7}{6}$ of $59\frac{1}{2} = \frac{7}{800}$ of $\frac{7}{8}$ of $\frac{2}{3}$ of $\frac{4}{7}$ of $\frac{2}{3}$ of $\frac{7}{8}$ of $59\frac{1}{2} = 7$.

$\therefore$ one side scores 7 times as many runs as the other.

PAPER V.

(1) Let 1 represent what B owes to A ; then $.6$, or $\frac{6}{10}$ or $\frac{3}{5} =$ what C owes to B ; $1 - \frac{3}{5} = \frac{2}{5} =$ how much B 's debt to A exceeds that of C 's to B . If $\frac{2}{5} = 5s$. then $\frac{1}{5} = 2s$. 6d., and $\frac{3}{5}$, or the whole = $2s$. 6d. $\times 5 = 12s$. 6d.

(2) $\frac{1}{2} + 50s. =$ what was first taken out; $\therefore \frac{1}{2} - 50s. =$ what then remained. $.2$ or $\frac{2}{10}$, or $\frac{1}{5}$ of $(\frac{1}{2} - 50s.) + 30s. = \frac{1}{10} + 20s. =$ what was next taken; $(\frac{1}{2} + 50s.) + (\frac{1}{10} + 20s.) = (\frac{6}{10} + 70s.) =$ what had then been taken out; $\therefore \frac{4}{10} - 70s. =$ what was left. $.25$ or $\frac{25}{100}$, or $\frac{1}{4}$ of $(\frac{4}{10} - 70s.) + 20s. = \frac{1}{10} - 17\frac{1}{2}s. + 20s. = \frac{1}{10} + 2\frac{1}{2}s. =$ what was taken out the third time. $(\frac{6}{10} + 70s.) + (\frac{1}{10} + 2\frac{1}{2}s.) = \frac{7}{10} + 72\frac{1}{2}s. =$ total amount taken out; $\therefore \frac{3}{10} - 72\frac{1}{2}s. =$ amount remaining in the bag, which by the question = $10s.$ $\therefore \frac{3}{10} - 72\frac{1}{2}s. = 10s.$, or $\frac{3}{10} = 82\frac{1}{2}s.$, or $\frac{1}{10} = 27\frac{1}{2}s.$, $\therefore \frac{1}{10}$ or the whole = $27\frac{1}{2}s. \times 10 = 275s.$

(3) *A* supplies 26 cub. yds. in $3\frac{1}{2}$ hrs., or 8 cub. yds. per hr.; *B* supplies $12\frac{1}{2}$ cub. yds. in $2\frac{1}{2}$ hrs., or 5 cub. yds. per hr. Together *A* and *B* supply $8 + 5 = 13$ cub. yds. per hr. *C* discharges $11\frac{3}{4}$, or $11\frac{1}{2}$ cub. yds. in $1\frac{1}{2}$ hrs., or $6\frac{1}{2}$ cub. yds. per hr.

In 12 hrs. *A* will supply $8 \times 12 = 96$ cub. yds.; and *C* will discharge $6\frac{1}{2} \times 12 = 78$ cub. yds.; $\therefore$ the number of cub. yds. actually filled will be $96 - 78 = 18$. Number cub. yds. requiring to be filled = 75, or $\frac{3}{4}$ of $286 = 214\frac{1}{2}$ cub. yds., and number already filled = 18; $\therefore$ No. remaining to be filled = $214\frac{1}{2} - 18 = 196\frac{1}{2}$ cub. yds. Now if *A* and *B* together fill 13 cub. yds. per hr. while *C* discharges $6\frac{1}{2}$ cub. yds. per hr., the number of cub. yds. actually filled per hr. is $13 - 6\frac{1}{2} = 6\frac{1}{2}$; and number of hrs. required to fill $196\frac{1}{2}$ cub. yds. = $196\frac{1}{2} \div 6\frac{1}{2} = 30\frac{1}{3}$ hrs., which added to the previous 12 hrs. will amount to $42\frac{2}{3}$ hrs.

(4)

500 envelopes at 44 cts. per 100	=\$ 2.20
3 boxes elastic bands at 33 cts.	=\$ 0.99
$\frac{1}{2}$ gross penholders at 19 cts. per doz.	=\$ 1.14
$2\frac{1}{2}$ reams foolscap at 21 cts. a quire	=\$10.50
4 doz. quill pens at 9 cts.	=\$ 0.36
13 note books at 27 cts.	=\$ 3.51
250 official envelopes at 48 cts. per 100	=\$ 1.20

(5)

	\$19.90
$7\frac{1}{2}$ lbs. lamb at 10 cts.	=\$0.75
$19\frac{1}{2}$ lbs. mutton at 8 cts.	=\$1.56
18 lbs. ham at 15 cts.	=\$2.70
$5\frac{1}{2}$ lbs. suet at 10 cts.	=\$0.55
9 chops at 4 cts.	=\$0.36

(6)

	\$5.92
17 yds calico at 19 cts.	=\$ 3.23
$25\frac{1}{2}$ yds. — at 55 cts.	=\$14.02 $\frac{1}{2}$
$34\frac{1}{2}$ yds. flannel at 60 cts.	=\$20.70
11 pairs stockings at 38 cts.	=\$ 5.32
5 pairs gloves at \$12 per doz.	=\$ 5.00

\$48.97 $\frac{1}{2}$

Ex. LXV. (p. 112.)

$$\begin{array}{llll}
 \text{(1)} & \text{(2)} & \text{(3)} & \text{(4)} \\
 \frac{9 \times 12}{4} = 27. & \frac{9 \times 24}{32} = 6\frac{1}{2}. & \frac{6 \times 10}{4} = 15. & \frac{\frac{1}{3} \times \frac{1}{2}}{\frac{1}{4}} = \frac{1}{6}. \\
 \text{(5)} & \text{(6)} & \text{(7)} & \\
 \frac{8 \times .79}{.05} = 12.64. & \frac{10 \times 45}{.3} = 15. & \frac{\frac{1}{4} \times \frac{1}{2}}{\frac{1}{16}} = \frac{1}{8}. \\
 \text{(8)} & \text{(9)} & \text{(10)} & \\
 \frac{1.2 \times .39}{1.3} = .36. & \frac{\frac{9}{14} \times \frac{7}{12}}{\frac{1}{8}} = \frac{1}{4}. & \frac{4.22 \times 17.6}{23\frac{1}{2}} = 32.
 \end{array}$$

Ex. LXVI. (p. 115.)

- (1) 8 bus. : 24 bus. :: \$16 is to the price required.
 $\therefore$ Price required = $\$ \frac{24 \times 16}{8} = \$48.$
- (2) 2 bus. : 33 bus. :: \$1.10 : required price.
 $\therefore$ Required price = $\$ \frac{33 \times 1.10}{2} = \$18.15.$
- (3) 9 bus. : 4 bus. 20 lbs. :: \$36 : required cost.
 $\therefore$ Required cost = $\$ \frac{260 \times 36}{540} = \$17.33\frac{1}{3}.$
- (4) 55 cts. : \$21.25 :: 1 bus. : no. of bus. required.
 $\therefore$ No. required = $\frac{2125 \times 1}{55}$ bus. = 38 bus. 21 $\frac{1}{5}$ lbs.
- (5) 84 cts. : \$17.20 :: 1 bus. : number required.
 $\therefore$ No. required = $\frac{1720 \times 1}{84}$ bus. = 20 bus. 28 $\frac{1}{3}$ lbs.
- (6) 1 oz. : 21 lbs. 4 oz. :: 6s. 5d. : required price.
 $\therefore$ Required price = $\frac{256 \times 77}{1}$ d. = 19712d. = £82 2s. 8d.
- (7) 16 cts. : \$162.36 :: 1 lb. : number required.
 $\therefore$ No. required = $\frac{46236 \times 1}{16}$ lbs. = 2889 $\frac{1}{4}$ lbs. = 28 cwt.
- 3 qrs. 14 lbs. 12 oz.
- (8) \$23856 : \$10496.64 :: \$1 : dividend in \$1.
 $\therefore$ Dividend required = $\$ \frac{1049664 \times 1}{2385600} = \$44 = 44$ cts.

(9) No. of days in 1864 = 366.

366 dys. : 1 dy. :: \$106.14 : amount required.

∴ Amount required = $\frac{10614 \times 1}{366}$ cts. = 29 cts.

(10) 1 ml. : 20 mls. 5 fur. 22 yds. :: \$393.75 : req^d. cost.

∴ Required cost = \$ $\frac{393.75 \times 35222}{1760}$ = \$8126.01 $\frac{9}{16}$.

(11) \$133.12 : \$449.28 :: 6 cwt. 2 qrs. : weight req^d.

∴ Required weight = $\frac{26 \times 44928}{13312}$ qrs. = 87 $\frac{1}{4}$ qrs. =

21 cwt. 3 qrs. 18 lbs. 12 oz.

(12) \$32.15 : \$286.66 $\frac{1}{4}$:: \$183.75 : value required.

∴ Value required = \$ $\frac{183.75 \times 28666 \frac{1}{4}}{3215}$ = \$1638.40 $\frac{535}{1280}$.

(13) \$10000 : \$3875 :: \$1 : dividend on \$1.

∴ Dividend = \$ $\frac{3875 \times 1}{10000}$ = .3875 = 38 $\frac{3}{4}$ cts.

∴ Each creditor will lose in \$1, \$1 - 38 $\frac{3}{4}$ cts. = 61 $\frac{1}{4}$ cts.

(14) 60 men : 84 men :: 5 months : time required.

∴ Time required = $\frac{85 \times 5}{60}$ mos. = 7 mos. 7 mos.

-5 mos. = 2 months.

(15) 1134 yds. : 5313 yds. :: 3s. 4 $\frac{1}{2}$ d. : value req^d.

∴ Value req^d. = $\frac{5313 \times 81}{1134}$ half pence = 15s. 9 $\frac{3}{4}$ d.

(16) £1 : 17s. 6d. :: £3057 12s. : value required.

∴ Value of effects = $\frac{210 \times 61152}{240}$ s. = £2675 8s.

(17) 10 ft. 8 in. : 1 mi. 1280 yds. :: 4 steps : required number of steps.

∴ No. required = $\frac{109440 \times 4}{128}$ steps = 3420 steps.

(18) 31 ac. 3 ro. 9 po. 21 yds. : 49 ac. 3 ro. 38 po. 2 $\frac{1}{4}$ yds. :: £3025 12s. 4 $\frac{1}{2}$ d. : required price.

∴ Req^d. price = $\frac{967769 \times 1452297}{615853}$ half pence = £4754

10s. 10 $\frac{1}{2}$ d.

(19) Loss on \$1 = \$1 - 59 cts. = 41 cts.
 \$1 : \$13675 :: 41 cts. : required loss.

$$\therefore \text{Loss} = \frac{13675 \times 41}{1} \text{ cts.} = \$5606.75.$$

(20) 6 mi. : 10 mi. :: 1 hr. : time req^d. by 1st boy,
 $\therefore \text{time required} = \frac{10 \times 1}{6} \text{ hrs.} = 1 \text{ hr. } 40 \text{ min.}; \text{ also } 7\frac{1}{2}$
 mi. : 10 mi. :: 1 hr. : time required by 2nd boy, $\therefore$
 $\text{time required} = \frac{10 \times 1}{7\frac{1}{2}} \text{ hrs.} = 1 \text{ hr. } 20 \text{ min.}$

Therefore since 1 hr. 40 min. - 1 hr. 20 min. = 20 min.
 the first boy must start 20 minutes before second boy.

(21) 55 yds. : $\frac{1}{4}$ mi. :: 5 ft. : required gain.

$$\therefore \text{Required gain} = \frac{880 \times 5}{55} \text{ ft.} = 80 \text{ ft.} = 26 \text{ yds. } 2 \text{ ft.}$$

(22) 45 cts. : 55 cts. :: 36 doz. pairs : required no. of pairs.

$$\therefore \text{Required no.} = \frac{36 \times 55}{45} \text{ doz.} = 44 \text{ doz.} = 528 \text{ pairs.}$$

(23) 168 dys. : 266 dys. :: 108 men : required no. of men.

$$\therefore \text{Required no.} = \frac{266 \times 108}{168} \text{ men} = 171 \text{ men.}$$

(24) \$12571.87 $\frac{1}{2}$: \$1 :: \$419.06 $\frac{1}{4}$: rate per \$.

$$\therefore \text{Rate per \$} = \$ \frac{419.06\frac{1}{4} \times 1}{12571.87\frac{1}{2}} = 3\frac{1}{2} \text{ cts.}$$

Also, \$1 : \$1734.37 $\frac{1}{2}$:: 3 $\frac{1}{2}$ cts. : required payment.

$$\therefore \text{Req^d. payment} = \$ \frac{346875 \times 3\frac{1}{2}}{200} \text{ cts.} = \$57.812\frac{1}{2}.$$

(25) Number of days in 1863 = 365.

Yearly expenditure = \$2500 - \$994.37 $\frac{1}{2}$ = \$1505.62 $\frac{1}{2}$.

365 dys. : 1 dy. :: \$1505.62 $\frac{1}{2}$: average daily expenditure.

$$\text{Req^d. expenditure} = \$ \frac{1505.62\frac{1}{2} \times 1}{365} = \$4.12\frac{1}{2}.$$

(26) 20 dys. : 27 dys. :: 100 men : req^d. no. of men.

$$\therefore \text{Req}^d. \text{ no. of men} = \frac{27 \times 100}{20} \text{ men} = 135 \text{ men.}$$

(27) 44 ft. : 109 miles :: 1 sec. : time req^d. by train.

$$\therefore \text{Time required} = \frac{575520 \times 1}{44} \text{ sec.} = 13080 \text{ sec.} = 3$$

hrs. 38 min.; 8 hrs. + 3 hrs. 38 min. = 11 hrs. 38 min.

(28) 22 cts. : \$1718.75 :: \$1 : amount of debt.

$$\therefore \text{Required amt.} = \frac{171875 \times 100}{22} \text{ cts.} = \$7812.50.$$

Also, his amount of indebtedness to first creditor will be \$7812.50 - (\$1250 × 2 + \$816 × 3) = \$7812.50 - \$4948 = \$2864.50.

Then \$1 : \$2864.50 :: 22 cts. : what first creditor will receive.

$$\therefore \text{1st cr. will receive} = \frac{286450 \times 22}{100} \text{ cts.} = \$630.19, \text{ and}$$

will therefore lose \$2864.50 - \$630.19 = \$2234.31.

(29) 42s. : 70s. :: 4½d. : required cost.

$$\therefore \text{Req}^d. \text{ cost} = \frac{70 \times 9}{42} \text{ half pence} = 7½d.$$

(30) 5 men + 5 boys = 5 men + 3 men = 8 men.

10 men : 8 men :: 15 days : time required.

$$\therefore \text{Time required} = \frac{8 \times 15}{10} \text{ days} = 12 \text{ days.}$$

(31) 1 lb. 10 oz. 10 dwts. : 1 oz. :: £6 3s. 9d. : req^d. 4th term.

$$\therefore \text{4th proportional} = \frac{20 \times 1485}{450} \text{ d.} = 5s. 6d.$$

(32) Expenditure for the year will be \$2084.50 - \$250 = \$1784.50. Also, the year 1864 contains 366 days, and January 31 days.

366 days : 31 days :: \$1784.50 : req^d. expenditure.

$$\therefore \text{Req}^d. \text{ expenditure} = \frac{31 \times 1784.50}{366} = \$151.14\frac{1}{3}.$$

$$(33) \text{ £1}-6\text{d.} = 19\text{s. } 6\text{d.}$$

$$19\text{s. } 6\text{d.} : \text{£1} :: \text{£877 } 10\text{s.} : \text{original income.}$$

$$\therefore \text{Original income} = \frac{240 \times 17550}{234} \text{ s.} = \text{£900.}$$

$$(34) (1) 7\text{d.} : \text{£29 } 8\text{s. } 4\text{d.} :: \text{£1} : \text{required income.}$$

$$\therefore \text{Reqd. income} = \text{£} \frac{7000 \times 1}{7} = \text{£1000.}$$

$$(2) \text{ £1}-7\text{d.} = 19\text{s. } 5\text{d.}$$

$$19\text{s. } 5\text{d.} : \text{£1} :: \text{£932} : \text{required income.}$$

$$\therefore \text{Reqd. income} = \text{£} \frac{240 \times 932}{233} = \text{£960.}$$

$$(35) \text{ Weight of gold} = (\text{£150} \div \text{£3 } 17\text{s. } 10\frac{1}{2}\text{d.}) \text{ oz} = 38\frac{27}{86}\text{ oz.}$$

$$1 \text{ lb.} : 38\frac{27}{86}\text{ oz.} :: 54\text{s. } 6\text{d.} : \text{required value.}$$

$$\therefore \text{Reqd. val.} = \frac{72000 \times 654}{1869 \times 12} \text{ d.} = \frac{1308000}{623} \text{ d.}$$

$$= 2099\frac{1}{2}\text{d. } \frac{16}{623}\text{q.} = \text{£8 } 14\text{s. } 11\frac{1}{2}\text{d. } \frac{16}{623}\text{q.}$$

$$(36) \text{ If 25 men can finish the work in 16 days, 1 man in 1 day will do } \frac{1}{16 \times 25} = \frac{1}{400} \text{ of the work. If all the men work for 4 days they will do } \frac{1}{4} \text{ of the whole work. } \therefore \frac{3}{4} \text{ remain to be done.}$$

$$\text{Then } \frac{1}{400} : \frac{3}{4} :: 1 \text{ man} : \text{no. that would finish it in 1 day. } \therefore \text{No. reqd.} = \frac{\frac{3}{4} \times 1}{\frac{1}{400}} = \frac{3 \times 1 \times 400}{4} = 300 \text{ men, and therefore 10 men can finish it in 30 days.}$$

$$(37) 1 \text{ ct.} + 1\frac{1}{2} \text{ cts.} = 2\frac{1}{2} \text{ cts. } \$1 - 2\frac{1}{2} \text{ cts.} = 97\frac{1}{2} \text{ cts.}$$

$$97\frac{1}{2} \text{ cts.} : \$1 :: \$1855 : \text{required income.}$$

$$\therefore \text{Reqd. income} = \$ \frac{1855 \times 100}{97\frac{1}{2}} = \$1902.56\frac{1}{3}\text{¢.}$$

$$(38) \frac{6}{7} \text{ qrs.} : \frac{4}{5} \text{ bus.} :: 54\text{s.} : \text{required price.}$$

$$\therefore \text{Reqd. price} = \frac{\frac{4}{5} \times 54}{\frac{6}{7} \times 8} = \frac{4 \times 54 \times 7}{6 \times 9 \times 8} \text{ s.} = 3\text{s. } 6\text{d.}$$

$$(39) 1\frac{1}{2} \text{ cwt.} : \frac{1}{11} \text{ ton} :: \text{£7 } 3\text{s.} : \text{required price.}$$

$$\therefore \text{Reqd. price} = \frac{\frac{1}{11} \times 20 \times 143}{1\frac{1}{2}} \text{ s.} = \frac{6 \times 20 \times 143 \times 15}{11 \times 13} \text{ s.} = \text{£90.}$$

(40) $1\frac{3}{5}$ d. : £1 6s. 6d. :: $\frac{1}{192}$ of $\frac{1}{2}$ of $2\frac{1}{2}$ of 4 lbs : required number of lbs.

$$\therefore \text{Reqd. no. of lbs.} = \frac{\frac{1}{192} \times \frac{1}{2} \times 2\frac{1}{2} \times 40 \times 318}{1\frac{3}{5}} \text{ lbs.} = 104\frac{1}{2} \text{ lbs.} = 104 \text{ lbs. } 2\frac{1}{2} \text{ oz.}$$

(41) From 6 A. M. on Sunday till Tuesday noon are 54 hours, and till 1 P. M. on Saturday the clock will indicate 151 hours.

$\therefore$ 54 hrs. 24 min. : 151 hrs. :: 24 min. : gain on true time.

$$\therefore \text{Gain on true time} = \frac{151 \times 60 \times 24}{3264} \text{ min.} = 66\frac{1}{4} \text{ min.},$$

$$\therefore \text{true time will be 1 P. M.} - 66\frac{1}{4} \text{ min.} = 11:53\frac{1}{4} \text{ A. M.}$$

(42) While hour hand travels 5 minutes, minute hand travels 60 minutes, $\therefore$ the minute hand gains 55 minutes per hour.

$\therefore$ 55 min. : 1 hour :: 60 min. : time required.

$$\therefore \text{Time reqd} = \frac{60 \times 60}{55} = 65\frac{5}{11} \text{ min.} = 1 \text{ hour } 5\frac{5}{11} \text{ min.}$$

(43) 5 lbs. : .0625 cwt. :: .0703125 of \$4 : reqd. price.

$$\therefore \text{Reqd. price} = \$ \frac{.0703125 \times 4 \times .0625 \times 20}{5} = \$35.15625$$

$$= 35.15625 \text{ cts.}$$

(44) 1 man = $\frac{2}{3}$ boys; 1 woman = $\frac{1}{3}$ boys; $\therefore$ 5 men = $4\frac{2}{3}$ boys; 4 women = $3\frac{2}{3}$ boys; therefore 5 men, 4 women and 2 boys = $(4\frac{2}{3} + 3\frac{2}{3} + 2)$ boys = $18\frac{1}{3}$ boys.

$\therefore$ $18\frac{1}{3}$ boys : 9 boys :: 18 days : no. required; $\therefore$ required number of days = $\frac{18\frac{1}{3}}{9} \times 9 \times 18 = 8\frac{1}{3}$.

(45) If $\frac{3}{8}$ of the estate be sold, the remr. will be $\frac{5}{8}$.

$\frac{1}{8}$ of $\frac{7}{9}$ of $\frac{2}{3}$: $\frac{3}{8}$:: $1\frac{1}{6}$ of $\frac{8}{9}$ of £600 : required price.

$$\therefore \text{Required price} = £ \frac{\frac{1}{8} \text{ of } \frac{8}{9} \text{ of } 600 \times \frac{2}{3}}{\frac{1}{8} \text{ of } \frac{7}{9} \text{ of } \frac{2}{3}} = £ \frac{623 \times \frac{2}{3}}{1\frac{1}{3}} =$$

$$£ \frac{623 \times 2}{14 \times 3} = £400\frac{1}{3}.$$

(46) 1 oz. : 2.683 lbs. :: £4.00 : required price.

$$\therefore \text{Required price} = £4.00 \times 2.683 \times 12 = £4.10 \times 24 \frac{1}{10} \times 12 = £ \frac{41 \times 161 \times 12}{10 \times 60} = £132 \frac{1}{10} = £132 \text{ Os. } 4 \frac{1}{4} \text{ d. } \frac{1}{4} \text{ q.}$$

(47) 7 dys. : 1 dy. :: \$22.12 : amount earned by 4 men and 5 boys per day; $\therefore$ amount of earnings = $\$ \frac{22.12 \times 1}{7} = \3.16 .

Also, 9 dys. : 1 dy. :: \$28.98 : amount earned by 3 men and 5 boys per day; $\therefore$ amount = $\$ \frac{28.98 \times 1}{9} = \3.22 .

And if 4 men and 5 boys earn \$3.16 per day, 12 men and 15 boys will earn \$9.48 per day; similarly, if 3 men and 8 boys earn \$3.22 per day, 12 men and 32 boys will earn \$12.88 per day; or, 12 men and 32 boys will earn \$3.40 more than 12 men and 15 boys; $\therefore$ the \$3.40 must have been earned by the extra 17 boys.

Then 17 boys : 1 boy :: \$3.40 : amount of a boy's earnings per day; $\therefore$ amount = $\$ \frac{3.40 \times 1}{17} = 20 \text{ cts.}$

Now if 4 men and 5 boys earn \$3.16 per day, 4 men working alone will earn \$3.16 - \$1 (the earnings of 5 boys), or 4 men will earn \$2.16, or 1 man will earn 54 cts; $\therefore$ a man and a boy will together earn (54 + 20) cts. per day = 74 cts.; $\therefore$ 12 men and 12 boys will together earn (74 × 12) cts. = \$8.88 per day.

Then \$8.88 : \$186.48 :: 1 day : req^d. no. of days.

$$\therefore \text{Required no.} = \frac{186.48 \times 1}{8.88} \text{ days} = 21 \text{ days.}$$

(48) If *A* completes the work in 5 hrs., in 1 hr. he will do $\frac{1}{5}$ of it; $\therefore$ 1 hr. : 40 min :: $\frac{1}{5}$: amount of work that *A* performs; $\therefore$ amount that *A* performs = $40 \times \frac{1}{5} = 8$.

Also, if *B* can finish the work in 9 hrs., in 1 hr. he will do $\frac{1}{9}$; $\therefore$ 1 hr. : 1 $\frac{1}{3}$ hrs. :: $\frac{1}{9}$: amount that *B* per-

forms; $\therefore$ amt. that B performs $= \frac{\frac{1}{2} \times 1\frac{1}{2}}{1} = \frac{1}{4}$.

$1 - (\frac{1}{8} + \frac{1}{4}) =$ amount remaining to be done $= \frac{1}{8}$.

Also, if C can perform the work in 15 hrs., in 1 hr. he will do $\frac{1}{15}$; $\therefore \frac{1}{8} : \frac{1}{15} :: 1 \text{ hr.} : \text{time required by } C \text{ to finish the remainder.}$

$\therefore$ Time required $= \frac{\frac{1}{8} \times 1}{\frac{1}{15}}$ hours $= 10\frac{1}{2}$ hours.

(49) (1500 + 700) men : 1500 men $::$ 11 months. : time required to consume the remaining provisions.

$\therefore$ Time required $= \frac{1500 \times 11}{2200}$ mos. $= 7\frac{1}{2}$ mos., which,

added to the 2 months during which the 1500 men had been consuming the provisions, gives $9\frac{1}{2}$ months.

(50) The first travels $4\frac{1}{2}$ miles per hr., and the second 3 miles per hr., therefore they together travel $7\frac{1}{2}$ miles per hour. $\therefore 7\frac{1}{2}$ miles : 30 mls. $::$ 1 hr. : no. of hrs. in which they will meet.

$\therefore$ No. of hrs. $= \frac{30 \times 1}{7\frac{1}{2}}$ hrs. $= 4$ hrs.; and 8.30 A. M.

+ 4 hrs. $=$ 12.30 P. M.

Also, $7\frac{1}{2}$ miles : $4\frac{1}{2}$ miles $::$ 30 miles : distance first travels.

$\therefore$ Distance $= \frac{30 \times 4\frac{1}{2}}{7\frac{1}{2}} = 18$ mls. i.e. 12 mls. from Whitby, or 10 miles from the given place.

(51) The 2 trains together go (24 + 27) miles $=$ 51 miles per hour; the length of the 2 trains is (210 + 180) feet $=$ 390 feet.

Therefore, 51 miles : 390 feet $::$ 1 hr. : req^d. time.

$\therefore$ Required time $= \frac{390 \times 60 \times 60}{51 \times 5280}$ sec. $= 5\frac{40}{137}$ sec.

EX. LXVII. (p. 121.)

(1) $\begin{matrix} 10 : 15 \\ 9 : 12 \end{matrix} \} :: 4 \text{ weeks} : \text{no. of weeks required.}$

$\therefore$ No. of weeks req^d $= \frac{4 \times 15 \times 12}{10 \times 9}$ weeks $= 8$ wks.

$$(2) \begin{array}{l} 1 : 2 \\ 27 : 36 \end{array} \} :: 42 \text{ men} : \text{required number of men.}$$

$$\therefore \text{Required number} = \frac{42 \times 36 \times 2}{27 \times 1} = 112 \text{ men.}$$

$$(3) \begin{array}{l} 135 : 60 \\ 1 : 4 \end{array} \} :: 36 \text{ dys.} : \text{required number of dys.}$$

$$\therefore \text{Req}^d. \text{ no. of days} = \frac{36 \times 4 \times 60}{135 \times 1} \text{ days} = 64 \text{ days.}$$

$$(4) \begin{array}{l} 104 : 102 \\ 34 : 122 \end{array} \} :: \$87.36 : \text{required cost.}$$

$$\therefore \text{Required cost} = \$ \frac{87.36 \times 122 \times 102}{34 \times 104} = \$307.44$$

$$(5) \begin{array}{l} \$100000 : \$1500000 \\ 3 : 7 \end{array} \} :: \$2500 : \text{required gain.}$$

$$\therefore \text{Required gain} = \$ \frac{2500 \times 7 \times 1500000}{3 \times 100000} = \$87500.$$

$$(6) \begin{array}{l} 7 : 21 \\ \$2.80 : 4.06 \end{array} \} :: 40 \text{ miles} : \text{required no. of miles.}$$

$$\therefore \text{Req}^d. \text{ no. of mls.} = \frac{40 \times 4.06 \times 21}{2.80 \times 7} = 174 \text{ miles.}$$

$$(7) \begin{array}{l} 7 : 45 \\ 20 : 9 \end{array} \} :: \$70 : \text{required cost.}$$

$$\therefore \text{Required cost} = \$ \frac{70 \times 9 \times 45}{20 \times 7} = \$202.50.$$

$$(8) \begin{array}{l} 24 : 16 \\ 560 : 1200 \end{array} \} :: 140 \text{ horses} : \text{req}^d. \text{ no. of horses.}$$

$$\therefore \text{Req}^d. \text{ no.} = \frac{140 \times 1200 \times 16}{560 \times 24} \text{ horses} = 200 \text{ horses.}$$

$$(9) \begin{array}{l} \$250 : \$625 \\ \$2000 : \$5000 \end{array} \} :: 16 \text{ months} : \text{req}^d. \text{ no. of mos.}$$

$$\therefore \text{Req}^d. \text{ no. of mos.} = \frac{16 \times 5000 \times 625}{2000 \times 250} = 100 \text{ months.}$$

$$(10) \begin{array}{l} 1878 : 22536 \\ 336 : 112 \end{array} \} :: 702 \text{ qrs.} : \text{req}^d. \text{ no. of qrs.}$$

$$\therefore \text{Req}^d. \text{ no. of qrs.} = \frac{702 \times 112 \times 22536}{336 \times 1878} = 2808 \text{ qrs.}$$

$$(11) \begin{array}{l} 6 : 24 \\ 4 : 2\frac{1}{2} \end{array} \} :: 17\frac{1}{2} \text{ acres} : \text{required no. of acres.}$$

$$\therefore \text{Req}^d. \text{ no. of ac.} = \frac{17\frac{1}{2} \times 2\frac{1}{2} \times 24}{4 \times 6} = 30 \text{ ac. 1 ro. 20 po.}$$

$$(12) \begin{array}{l} £240 : £234 \\ 91 : 49 \\ 56 : 48 \end{array} \} :: 20 \text{ months} : \text{req}^d. \text{ no of mos.}$$

$$\therefore \text{Req}^d. \text{ no. of mos.} = \frac{20 \times 48 \times 49 \times 234}{56 \times 91 \times 240} = 9 \text{ months.}$$

$$(18) \begin{array}{l} 100.8 \text{ lbs.} : 5186.16 \text{ lbs.} \\ 51.45 \text{ dys.} : 3 \text{ dys.} \end{array} \} :: 20 \text{ men} : \text{required number of men.}$$

$$\therefore \text{Req}^d. \text{ no. of men} = \frac{20 \times 3 \times 5186.16}{51.45 \times 100.8} = 60 \text{ men.}$$

$$(14) \begin{array}{l} 1 : \frac{1}{2} \\ \frac{1}{2} : 1 \end{array} \} :: 26 \text{ men} : \text{required number of men.}$$

$$\therefore \text{Req}^d. \text{ no.} = \frac{26 \times 1 \times \frac{1}{2}}{\frac{1}{2} \times 1} = \frac{26 \times 1 \times 1 \times 7}{2} = 91 \text{ men.}$$

or thus:

$$\begin{array}{l} 85 \text{ ac.} : 42\frac{1}{2} \text{ ac.} \\ 1\frac{1}{2} \text{ dys.} : 12 \text{ dys.} \end{array} \} :: 26 \text{ men} : \text{req}^d. \text{ number of men.}$$

$$\therefore \text{Req}^d. \text{ no. of men} = \frac{26 \times 12 \times 42\frac{1}{2}}{1\frac{1}{2} \times 85} = 91 \text{ men.}$$

$$(15) \begin{array}{l} 16 \text{ men} : 8 \text{ men} \\ 1 : 2 \\ 9 : 10 \end{array} \} :: 6 \text{ dys.} : \text{req}^d. \text{ no. of men.}$$

$$\therefore \text{Req}^d. \text{ no. of men} = \frac{6 \times 10 \times 2 \times 3}{9 \times 1 \times 16} = 2\frac{1}{2} \text{ days.}$$

$$(16) \begin{array}{l} 24 : 16 \\ 18400d. : 24840d. \\ \frac{1}{2} : 1 \end{array} \} :: 25 \text{ men} : \text{req}^d. \text{ no. of men.}$$

$$\therefore \text{Required no. of men} = \frac{25 \times 24840 \times 16}{\frac{1}{2} \times 18400 \times 24} = 45 \text{ men.}$$

$$(17) \begin{array}{l} 6664 : 798 \\ 57 : 119 \\ \frac{1}{2} : 1 \end{array} \} :: 357 \text{ qrs.} : \text{required no. of qrs.}$$

$$\therefore \text{Req}^d. \text{ no. of qrs.} = \frac{357 \times 1 \times 119 \times 798}{\frac{1}{2} \times 57 \times 6664} = 178\frac{1}{2} \text{ qrs.} = 178 \text{ qrs. 4 bus.}$$

$$(18) \begin{array}{l} 47.5 : 3.35 \\ 16 : 3.20 \end{array} \} :: \$1.14 : \text{required price per bus.}$$

$$\therefore \text{Required price} = \frac{1.14 \times 3.20 \times 3.35}{16 \times 47.5} = \$1.608.$$

$$(19) \begin{array}{l} 12 : 37\frac{1}{2} \\ 25 : 4 \end{array} \} :: \$14.40 : \text{required price.}$$

$$\therefore \text{Required price} = \$ \frac{14.40 \times 4 \times 37\frac{1}{2}}{25 \times 12} = \$7.20.$$

$$(20) \begin{array}{l} 6 : 4 \\ 12 : 8 \\ 220 : 175 \\ 35 : 36 \end{array} \} :: 11 \text{ days} : \text{required no. of days.}$$

$$\therefore \text{Req}^d. \text{ no. of dys.} = \frac{11 \times 36 \times 175 \times 8 \times 4}{35 \times 220 \times 12 \times 6} = 4 \text{ days.}$$

$$(21) \begin{array}{l} 20 : 18 \\ 135 \text{ in.} : 60 \text{ in.} \\ 378 \text{ in.} : 168 \text{ in.} \\ 80 : 100 \end{array} \} :: 9 \text{ dys.} : \text{required no. of dys.}$$

$$\therefore \text{Required no.} = \frac{9 \times 100 \times 168 \times 60 \times 18}{80 \times 378 \times 135 \times 20} = 2 \text{ days.}$$

$$(22) \begin{array}{l} 5 : 3 \\ 105 : 175 \\ 4 : 4\frac{1}{2} \\ 5 : 6 \end{array} \} :: 10 \text{ days} : \text{required no. of days.}$$

$$\therefore \text{Required no.} = \frac{10 \times 6 \times 4\frac{1}{2} \times 175 \times 3}{5 \times 4 \times 105 \times 5} \text{ dys.} = 18\frac{1}{2} \text{ dys.}$$

$$(23) \begin{array}{l} 8 : 12 \\ \$1.26 : \$1.80 \end{array} \} :: 1 \text{ lb. 11 oz. 12 drs.} : \text{req}^d. \text{ w'ght.}$$

$$\therefore \text{Required weight} = \frac{44\frac{1}{2} \times 1.80 \times 12}{1.26 \times 8} \text{ drs.} = 6660 \text{ drs.}$$

$$= 3 \text{ lbs. 11 oz. } 7\frac{1}{2} \text{ drs.}$$

$$(24) \begin{array}{l} 48 : 64 \\ 15 : 1 \\ 22 : 825 \end{array} \} :: 7\frac{1}{2} \text{ horses (equivalent to 12 ponies),} \\ : \text{required number of horses.}$$

$$\therefore \text{Req}^d. \text{ no. of horses} = \frac{7\frac{1}{2} \times 825 \times 1 \times 64}{22 \times 15 \times 48} = 25 \text{ horses.}$$

$$(25) \begin{array}{l} 11 : 9 \\ \frac{1}{4} : \frac{3}{4} \\ \frac{3}{7} : \frac{4}{7} \end{array} \} :: 55 \text{ men} : \text{reqd. number of men.}$$

$$\therefore \text{Reqd. no. of men} = \frac{55 \times \frac{1}{4} \times \frac{4}{3} \times 9}{\frac{3}{7} \times \frac{1}{4} \times 11} = 180 \text{ men.}$$

$$(26) \begin{array}{l} 15 : 5 \\ 10 : 15 \\ 12 : 5 \\ 1 : 4 \end{array} \} :: 3 \text{ feet} : \text{required number of feet.}$$

$$\therefore \text{Required no. of feet} = \frac{3 \times 4 \times 5 \times 15 \times 5}{1 \times 12 \times 10 \times 15} = 2\frac{1}{2} \text{ feet.}$$

Ex. LXVIII. (p. 124.)

- | | |
|------------------------------------|-----------------------------------|
| (1) 25 cts. = $\frac{1}{2}$ of \$1 | \$75.00 = value at \$1 each. |
| | 2 |
| | \$150.00 = value at \$2 each. |
| | 18.75 = value at 25 cts. each. |
| | \$168.75 = value at \$2.25 each. |
| (2) 50 cts. = $\frac{1}{2}$ of \$1 | \$105.00 = value at \$1 each. |
| | 52.50 = value at 50 cts. each. |
| | \$157.50 = value at \$1.50 each. |
| (3) 50 cts. = $\frac{1}{2}$ of \$1 | \$910.00 = value at \$1 each. |
| | 455.00 = value at 50 cts. each. |
| 25 cts. = $\frac{1}{2}$ of 50 cts. | 227.50 = value at 25 cts. each. |
| | \$1592.50 = value at \$1.75 each. |
| (4) 20 cts. = $\frac{1}{5}$ of \$1 | \$876.00 = value at \$1 each. |
| | 2 |
| | \$1752.00 = value at \$2 each. |
| | 175.20 = value at 20 cts. each. |
| | \$1927.20 = value at \$2.20 each. |
| (5) 25 cts. = $\frac{1}{4}$ of \$1 | \$1075.00 = value at \$1 each. |
| | 3 |
| | \$3225.00 = value at \$3 each. |
| | 268.75 = value at 25 cts. each. |
| | \$3493.75 = value at \$3.25 each. |

(6) 50 cts. = $\frac{1}{2}$ of \$1	\$1278.00 = value at \$1 each.
25 cts. = $\frac{1}{2}$ of 50 cts.	639.00 = value at 50 cts. each.
12 $\frac{1}{2}$ cts. = $\frac{1}{2}$ of 25 cts.	319.50 = value at 25 cts. each.
	159.75 = value at 12 $\frac{1}{2}$ c. each.
	<u>\$2396.25 = value at \$1.87$\frac{1}{2}$ each.</u>

	£	s.	d.
(7) 1s. = $\frac{1}{20}$ of £1	397	0	0 = value at £1.
	19	17	0 = value at 1s.
	<u>£416</u>	17	0 = value at £1 1s.

	£	s.	d.
(8) 5s. = $\frac{1}{4}$ of £1	250	0	0 = value at £1 each.
		2	
2s. 6d. = $\frac{1}{2}$ of 5s.	500	0	0 = value at £2 each.
	62	10	0 = value at 5s. each.
6d. = $\frac{1}{4}$ of 2s. 6d.	31	5	0 = value at 2s. 6d. each.
	6	5	0 = value at 6d. each.
	<u>£600</u>	0	0 = value at £2 8s. each.

(9) 50 cts. = $\frac{1}{3}$ of \$1	\$1324.00 = value at \$1 each.
	3
25 cts. = $\frac{1}{2}$ of 50 cts.	\$3972.00 = value at \$3 each.
	662.00 = value at 50 cts. each.
	331.00 = value at 25 cts. each.
	<u>\$4965.00 = value at \$3.75 each.</u>

	£	s.	d.
(10) 5s. = $\frac{1}{4}$ of £1	2678	0	0 = value at £1 each.
		2	
2s. 6d. = $\frac{1}{2}$ of 5s.	5356	0	0 = value at £2 each.
	669	10	0 = value at 5s. each.
	334	15	0 = value at 2s. 6d. ea.
	<u>£6360</u>	5	0 = val. at £2 7s. 6d. ea.

	£	s.	d.	
(11) 10s. = $\frac{1}{2}$ of £1	973	0	0	=value at £1 each.
5s. = $\frac{1}{2}$ of 10s.	486	10	0	=value at 10s. each.
1s. = $\frac{1}{2}$ of 5s.	243	5	0	=value at 5s. each.
6d. = $\frac{1}{2}$ of 1s.	48	13	0	=value at 1s. each.
2d. = $\frac{1}{2}$ of 6d.	24	6	6	=value at 6d. each.
$\frac{1}{2}$ d. = $\frac{1}{2}$ of 2d.	8	2	2	=value at 2d. each.
	2	0	6 $\frac{1}{2}$	=value at $\frac{1}{2}$ d. each.
	£812	17	2 $\frac{1}{2}$	=value at 16s. 8 $\frac{1}{2}$ d.

	£	s.	d.	
(12) 5s. = $\frac{1}{2}$ of £1	236	0	0	=value at £1 each.
			7	
10d. = $\frac{1}{2}$ of 5s.	1652	0	0	=value at £7 each.
1d. = $\frac{1}{2}$ of 10d.	59	0	0	=value at 5s. each.
	9	16	8	=value at 10d. each.
$\frac{1}{2}$ d. = $\frac{1}{2}$ of 1d.	19	8		=value at 1d. each.
	9	10		=value at $\frac{1}{2}$ d. each.
	£1722	6	2	=val. at £7 5s. 11 $\frac{1}{2}$ d.

	£	s.	d.	
(13) 10s. = $\frac{1}{2}$ of £1	9978	0	0	=value at £1 each.
			8	
3s. 4d. = $\frac{1}{2}$ of 10s.	79824	0	0	=value at £8 each.
4d. = $\frac{1}{2}$ of 3s. 4d.	4989	0	0	=value at 10s. each.
	1663	0	0	=val. at 3s. 4d. each.
$\frac{1}{2}$ = $\frac{1}{2}$ of 4d.	166	6	0	=value at 4d. each.
	20	15	9	=value at $\frac{1}{2}$ d. each.
	£86663	1	9	=value at £8 13s. 8 $\frac{1}{2}$ d.

	£	s.	d.	
(14) 10s. = $\frac{1}{2}$ of £1	15739	0	0	=val. at £1 each.
			9	
6s. 8d. = $\frac{1}{2}$ of £1	141651	0	0	=val. at £9 each.
1s. = $\frac{1}{2}$ of 10s.	7869	10	0	=val. at 10s. each.
1d. = $\frac{1}{2}$ of 1s.	5246	6	8	=val. at 6s. 8d. ea.
$\frac{1}{2}$ d. = $\frac{1}{2}$ of 1d.	786	19	0	=val. at 1s. each.
	65	11	7	=val. at 1d. each.
$\frac{1}{4}$ d. = $\frac{1}{2}$ of $\frac{1}{2}$ d.	32	15	9 $\frac{1}{2}$	=val. at $\frac{1}{2}$ d. each.
	16	7	10 $\frac{1}{4}$	=val. at $\frac{1}{4}$ d. each.
	£155668	10	11 $\frac{1}{2}$	=val. at £9 17s. 9 $\frac{1}{2}$ d.

$$(15) \ 50 \text{ cts.} = \frac{1}{2} \text{ of } \$1 \quad \begin{array}{r} \$27835.00 \\ 9 \end{array} = \text{value at } \$1 \text{ each.}$$

$$12\frac{1}{2} \text{ cts.} = \frac{1}{4} \text{ of } 50 \text{ cts.} \quad \begin{array}{r} \$250515.00 \\ 18917.50 \\ 3479.87\frac{1}{2} \end{array} = \begin{array}{l} \text{value at } \$9 \text{ each.} \\ \text{va'. at } 50 \text{ cts. each.} \\ \text{va'. at } 12\frac{1}{2} \text{ c. each.} \end{array}$$

$$\begin{array}{r} \$267911.87\frac{1}{2} \end{array} = \text{va'. at } \$9.62\frac{1}{2} \text{ each.}$$

$$(16) \ 50 \text{ cts.} = \frac{1}{2} \text{ of } \$1 \quad \begin{array}{r} \$37832.00 \\ 18 \end{array} = \text{value at } \$1 \text{ each.}$$

$$20 \text{ cts.} = \frac{1}{5} \text{ of } \$1 \quad \begin{array}{r} \$680976.00 \\ 18916.00 \end{array} = \begin{array}{l} \text{value at } \$18 \text{ each.} \\ \text{va'. at } 50 \text{ cts. each.} \end{array}$$

$$20 \text{ cts.} = \frac{1}{5} \text{ of } \$1 \quad \begin{array}{r} 7566.40 \\ 7566.40 \end{array} = \begin{array}{l} \text{va'. at } 20 \text{ cts. each.} \\ \text{va'. at } 20 \text{ cts. each.} \end{array}$$

$$\begin{array}{r} \$715034.80 \end{array} = \text{va'. at } \$18.90 \text{ each.}$$

$$(17) \ 20 \text{ cts.} = \frac{1}{5} \text{ of } \$1 \quad \begin{array}{r} \$250215.00 \\ 50043.00 \end{array} = \begin{array}{l} \text{value at } \$1 \\ \text{value at } 20 \text{ cts.} \end{array}$$

$$5 \text{ cts.} = \frac{1}{4} \text{ of } 20 \text{ cts.} \quad \begin{array}{r} 12510.75 \\ 10008.60 \end{array} = \begin{array}{l} \text{value at } 5 \text{ cts.} \\ \text{value at } 4 \text{ cts.} \end{array}$$

$$4 \text{ cts.} = \frac{1}{5} \text{ of } 20 \text{ cts.} \quad \begin{array}{r} \$72562.35 \end{array} = \text{value at } 20 \text{ cts.}$$

$$(18) \ 50 \text{ cts.} = \frac{1}{2} \text{ of } \$1 \quad \begin{array}{r} \$12815.00 \\ 6407.50 \end{array} = \begin{array}{l} \text{value at } \$1. \\ \text{value at } 50 \text{ cts.} \end{array}$$

$$25 \text{ cts.} = \frac{1}{4} \text{ of } 50 \text{ cts.} \quad \begin{array}{r} 3203.75 \\ 9611.25 \end{array} = \begin{array}{l} \text{value at } 25 \text{ cts.} \\ \text{value at } 75 \text{ cts.} \end{array}$$

£ s. d.

$$(19) \ 10\text{s.} = \frac{1}{2} \text{ of } £1 \quad \begin{array}{r} 4970 \end{array} \begin{array}{r} 0 \ 0 \end{array} = \text{value at } £1.$$

$$1\text{s.} = \frac{1}{20} \text{ of } 10\text{s.} \quad \begin{array}{r} 2485 \end{array} \begin{array}{r} 0 \ 0 \end{array} = \text{value at } 10\text{s.}$$

$$248 \begin{array}{r} 10 \ 0 \end{array} = \text{value at } 1\text{s.}$$

$$1\text{d.} = \frac{1}{12} \text{ of } 1\text{s.} \quad \begin{array}{r} 20 \ 14 \ 2 \end{array} = \text{value at } 1\text{d.}$$

$$\frac{1}{2}\text{d.} = \frac{1}{24} \text{ of } 1\text{d.} \quad \begin{array}{r} 10 \ 7 \ 1 \end{array} = \text{value at } \frac{1}{2}\text{d.}$$

$$\begin{array}{r} £2764.11 \ 3 \end{array} = \text{value at } 11\text{s. } 1\frac{1}{2}\text{d.}$$

d.

$$(20) \ \frac{1}{2}\text{d.} = \frac{1}{2} \text{ of } 1\text{d.} \quad \begin{array}{r} 83 \\ 11 \end{array} = \text{value at } 1\text{d. per yd.}$$

$$\begin{array}{r} £3 \ 16 \ 1 \end{array} = \text{value at } 11\text{d. per yd.}$$

$$\begin{array}{r} 3 \ 5\frac{1}{2} \end{array} = \text{value at } \frac{1}{2}\text{d. per yd.}$$

$$\begin{array}{r} 3 \ 19 \ 6\frac{1}{2} \end{array} = \text{value at } 11\frac{1}{2}\text{d. per yd.}$$

$$\frac{1}{2} \text{ of } 11\frac{1}{2} =$$

$$\begin{array}{r} 5\frac{1}{4} \end{array}$$

$$\begin{array}{r} £4 \ 0 \ 0\frac{1}{4} \end{array} = \text{value of } 83\frac{1}{2} \text{ yds.}$$

6d. = $\frac{1}{2}$ of 1s.	£	s.	d.	
	2	17	0	=value at 1s. per yd.
4d. = $\frac{1}{3}$ of 1s.	1	8	0	=value at 6d. per yd.
	19	0		=value at 4d. per yd.
$\frac{1}{2}$ of 1s. 10d. =	5	4	6	=value at 1s. 10d. per yd.
	1	4	$\frac{1}{2}$	
	£5	5	10 $\frac{1}{2}$	=value of 57 $\frac{1}{2}$ yds.

$\frac{1}{4}$ d. = $\frac{1}{12}$ of 9d.	s.	d.	
	9	10	=value at 1d. per yd.
	9		
	4	8	6 =value at 9d. per yd.
	7	4 $\frac{1}{2}$	=value at $\frac{1}{4}$ d. per yd.
	£4	15	10 $\frac{1}{2}$ =value at 8 $\frac{1}{2}$ d. per yd.

£	s.	d.
4	0	0 $\frac{1}{2}$
5	5	10 $\frac{1}{2}$
4	15	10 $\frac{1}{2}$

£14 1 9 $\frac{1}{2}$ = total amount.

Ex. LXIX. (p. 126.)

(1) 20 lbs. = $\frac{1}{3}$ of 1 bus.	\$1.20 =value of 1 bushel.
	55
	\$66.00 =value of 55 bushels.
	40 =value of 20 lbs.
5 lbs. = $\frac{1}{4}$ of 20 lbs.]	10 =value of 5 lbs.
	\$66.50 =value of 55 b. 25 lbs.

	10 cts. =value of 1 lb.,
(2) 2 qrs. = $\frac{1}{2}$ of 1 cwt.	∴ \$10.00 =value of 1 cwt.
	16
	\$160.00 =value of 16 cwt.
	5.00 =value of 2 qrs.
10 lbs. = $\frac{1}{4}$ of 2 qrs.	1.00 =value of 10 lbs.
10 lbs. = $\frac{1}{4}$ of 2 qrs.	1.00 =value of 10 lbs.
	\$167.00 =value of 16 cwt.
	2 qrs. 20 lbs.

(3) 2 ro. = $\frac{1}{2}$ of 1 ac.

\$15.50
8

= value of 1 ac.

\$124.00
12

= value of 8 ac.

10 per. = $\frac{1}{2}$ of 2 ro.

\$1488.00
7.75
96876

= value of 96 ac.

= value of 2 ro.

= value of 10 per.

\$149671875

= val. of 96 ac. 2 ro.

10 per.

(4) 10 dwt. = $\frac{1}{2}$ of 1 oz.

s. d.

7	1
32	

= value of 1 oz.

2 dwt. = $\frac{1}{2}$ of 10 dwt.1 dwt. = $\frac{1}{2}$ of 2 dwt.

£11 6 8

= val. of 2 lbs. 8 oz.

3 6 $\frac{1}{2}$ = value of 10 dwt.8 $\frac{1}{2}$ = value of 2 dwt.4 $\frac{1}{2}$ = value of 1 dwt.£11 11 3 $\frac{1}{2}$

= val. of 2 lbs. 8 oz.

13 dwt.

(5) 1 ft. 6 in. = $\frac{1}{2}$ of 1 yd.1 foot = $\frac{1}{2}$ of 1 yard.

s. d.

12	6
15	

= value of 1 yd.

1 inch = $\frac{1}{12}$ of 1 foot.

£9 7 6

= value of 15 yds.

6 3 = val. of 1 ft. 6 in.

4 2 = value of 1 ft.

4 $\frac{1}{2}$ = value of 1 in.£9 18 3 $\frac{1}{2}$

= value of 15 yds.

2 ft. 7 in.

(6) 72 in. = $\frac{1}{2}$ of 1 s. ft.

£ s. d.

1	7	0
259		

= value of 1 s. ft.

£349 13 0

= value of 259 s. ft.

or 28 s. yds. 7 s. ft.

13 6 = value of 72 in.

6 9 = value of 36 in.

4 $\frac{1}{2}$ = value of 2 in.£350 13 7 $\frac{1}{2}$

= val. of 28 s. yds.

7 s. ft. 110 in.

(7) 2 fur. = $\frac{1}{4}$ of 1 mi.	\$11000.00 = value of 1 mile.
	11
1 fur. = $\frac{1}{8}$ of 2 fur.	\$121000.00 = value of 11 mi.
	2750.00 = value of 2 fur.
55 yards = $\frac{1}{32}$ of 1 mi.	1375.00 = value of 1 fur.
	343.75 = value of 55 yds.
	\$125468.75 = value of 11 miles
	3 fur. 55 yds.

(8) $57\frac{1}{2}$ lbs. $\times 2 = 115$ lbs.
$73\frac{1}{2}$ lbs. $\times 3 = 221\frac{1}{2}$ lbs.

	336 $\frac{1}{2}$ lbs. = 3 cwt. 36 $\frac{1}{2}$ lbs.
25 lbs. = $\frac{1}{4}$ of 1 cwt.	\$25.00 = value of 1 cwt.
	3
10 lbs. = $\frac{1}{10}$ of 1 cwt.	\$75.00 = value of 3 cwt.
1 lb. = $\frac{1}{10}$ of 10 lbs.	6.25 = value of 25 lbs.
$\frac{1}{4}$ lb. = $\frac{1}{4}$ of 1 lb.	2.50 = value of 10 lbs.
	.25 = value of 1 lb.
	.06 $\frac{1}{2}$ = value of $\frac{1}{4}$ lb.
	\$84.06 $\frac{1}{2}$ = value of 3 cwt. 36 $\frac{1}{2}$ lbs.

(9) 50 ft. = $\frac{1}{8}$ of 100 ft.	\$5.00 = value per 100 feet.
	34
10 feet = $\frac{1}{8}$ of 50 feet.	\$170.00 = value of 3400 feet.
	2.50 = value of 50 feet.
	.50 = value of 10 feet.
	\$173.00 = value of 3460 feet.

(10) 500 = $\frac{1}{4}$ of 1000	\$4.00 = value per 1000 bricks.
	24
100 = $\frac{1}{4}$ of 500	\$96.00 = value of 24000.
50 = $\frac{1}{8}$ of 100	2.00 = value of 500.
	.40 = value of 100.
	.20 = value of 50.
	\$98.60 = value of 24650.

$$(11) \quad 500 = \frac{1}{4} \text{ of } 1000 \quad \begin{array}{r} \$10.25 \\ 46 \end{array} = \text{value per } 1000 \text{ ft.}$$

$$50 = \frac{1}{10} \text{ of } 500.$$

$$25 = \frac{1}{2} \text{ of } 50.$$

$$10 = \frac{1}{5} \text{ of } 50.$$

$$5 = \frac{1}{2} \text{ of } 10.$$

$$\begin{array}{r} \$471.50 \\ 5 \cdot 125 \end{array} = \text{value of } 46000 \text{ ft.}$$

$$5 \cdot 125 = \text{value of } 500 \text{ feet.}$$

$$\cdot 5125 = \text{value of } 50 \text{ feet.}$$

$$\cdot 25625 = \text{value of } 25 \text{ feet.}$$

$$\cdot 1025 = \text{value of } 10 \text{ feet.}$$

$$\cdot 05125 = \text{value of } 5 \text{ feet.}$$

$$\begin{array}{r} \$477 \cdot 54750 \\ \hline \end{array} = \text{value of } 46590 \text{ ft.}$$

$$(12) \quad \begin{array}{r} 19\frac{1}{2} \\ 17 \end{array} \text{ cts.} = \text{value of } 1 \text{ yard.}$$

$$\frac{1}{2} \text{ of } 19\frac{1}{2} \text{ cts.} = \begin{array}{r} \$3.31\frac{1}{2} \\ 12\frac{3}{8} \end{array} = \text{value of } 17 \text{ yards.}$$

$$\begin{array}{r} \$3.43\frac{1}{8} \\ \hline \end{array} = \text{value of } 17\frac{1}{2} \text{ yards.}$$

$$\begin{array}{r} 55\frac{1}{2} \\ 35 \end{array} \text{ cts.} = \text{value of } 1 \text{ yard.}$$

$$\frac{2}{3} \text{ of } 55\frac{1}{2} = \begin{array}{r} \$19.42\frac{1}{2} \\ 31\frac{7}{8} \end{array} = \text{value of } 35 \text{ yards.}$$

$$\begin{array}{r} \$19.73\frac{3}{4} \\ \hline \end{array} = \text{value of } 35\frac{2}{3} \text{ yards.}$$

$$\begin{array}{r} 70\frac{1}{2} \\ 96 \end{array} \text{ cts.} = \text{value of } 1 \text{ yard.}$$

$$\frac{1}{3} \text{ of } 70\frac{1}{2} \text{ cts.} = \begin{array}{r} \$67.68 \\ 51\frac{2}{3} \end{array} = \text{value of } 96 \text{ yards.}$$

$$\begin{array}{r} \$68.19\frac{3}{4} \\ \hline \end{array} = \text{value of } 96\frac{2}{3} \text{ yards.}$$

$$\begin{array}{r} 32\frac{1}{2} \\ 104 \end{array} \text{ cts.} = \text{value } 1 \text{ yard.}$$

$$\frac{2}{3} \text{ of } 32\frac{1}{2} \text{ cts.} = \begin{array}{r} \$33.80 \\ 27\frac{1}{2} \end{array} = \text{value of } 104 \text{ yards.}$$

$$\begin{array}{r} \$34.07\frac{1}{2} \\ \hline \end{array} = \text{value of } 104\frac{2}{3} \text{ yards.}$$

$17\frac{1}{2}$ cts. = value of 1 yard.
12

$\frac{1}{3}$ of $17\frac{1}{2}$ cts. =
 $\$2.07 =$ value of 12 yards.
.06 $\frac{1}{2}$

$\$2.13\frac{1}{2} =$ value of 12 $\frac{1}{2}$ yards.

$\$ 3.43\frac{1}{2}$
19.73 $\frac{3}{4}$
68.19 $\frac{1}{2}$
34.07 $\frac{1}{2}$
2.13 $\frac{1}{2}$

$\$127.57\frac{1}{4} =$ total amount.

(13) $12\frac{1}{2}$ cts. = value of 1 pound.
25

$\frac{1}{3}$ of $12\frac{1}{2} =$
 $\$3.12\frac{1}{2} =$ value of 25 lbs.
 $10\frac{1}{2}$

$\$3.23\frac{1}{2} =$ value of 25 $\frac{1}{2}$ lbs.

11 cts. = value of 1 pound.
19

$\frac{1}{2}$ of 11 =
 $\$2.09 =$ value of 19 lbs.
 $10\frac{1}{2}$

$\$2.19\frac{1}{2} =$ value of 19 $\frac{1}{2}$ lbs.

$8\frac{1}{2}$ cts. = value of 1 pound.
35

$\frac{1}{3}$ of $8\frac{1}{2} =$
 $\$2.97\frac{1}{2} =$ value of 35 lbs.
.07 $\frac{1}{2}$

$\$3.04\frac{1}{2} =$ value of 35 $\frac{1}{2}$ lbs.

$6\frac{1}{2}$ cts. = value of 1 pound.
17

$\frac{1}{2}$ of $6\frac{1}{2}$ = $\$1.10\frac{1}{4}$ = value of 17 lbs.
.03 $\frac{1}{4}$

$\$1.13\frac{1}{4}$ = value of 17 $\frac{1}{2}$ lbs.

$\$3.23\frac{1}{4}$
2.19 $\frac{1}{12}$
3.04 $\frac{1}{6}$
1.13 $\frac{1}{4}$

(14) $\$9.61\frac{1}{4}$ = total amount.
13 $\frac{1}{2}$ cts. = value of 1 pound.
17

$\frac{1}{3}$ of 12 $\frac{1}{2}$ = $\$2.12\frac{1}{2}$ = value of 17 lbs.
.11 $\frac{1}{2}$

$\$2.23\frac{1}{8}$ = value of 17 $\frac{3}{8}$ lbs.
17 $\frac{1}{2}$ cts. = value of 1 pound.
18

$\frac{2}{3}$ of 17 $\frac{1}{2}$ = $\$3.15$ = value of 18 lbs.
.13 $\frac{1}{8}$

$\$3.28\frac{1}{8}$ = value of 18 $\frac{1}{4}$ lbs.
75 cts. = value of 1 pound.
5

$\frac{5}{8}$ of 75 = $\$3.75$ = value of 5 pound.
.20 $\frac{3}{8}$

$\$3.95\frac{3}{8}$ = value of 5 $\frac{5}{8}$ lbs.
40 cts. = value of 1 pound.
10

$\frac{4}{7}$ of 40 = $\$4.00$ = value of 10 lbs.
.28 $\frac{4}{7}$

$\$4.28\frac{4}{7}$ = value of 10 $\frac{4}{7}$ lbs.

25 cts. = value 1 pound.

7 $\frac{1}{4}$ of 25 = $\$1.75$ = value of 7 lbs..18 $\frac{1}{4}$ $\$1.93\frac{1}{4}$ = value of 7 $\frac{1}{4}$ lbs. $\$2.23\frac{1}{4}$ 3.28 $\frac{1}{4}$ 3.95 $\frac{1}{2}$ 4.28 $\frac{1}{4}$ 1.93 $\frac{1}{4}$ $\$15.69\frac{11}{16}$ = total amount.

Ex. LXX. (p. 128.)

(1) $\$217.25$ 8 $\$17.3800$ = int. $\$17.38 + \$217.25 = \$234.63$
= amount.(3) $\$527.37\frac{1}{2}$ 7 $\$36.91625$ 3 $\$110.74875$ = int. $\$527.37\frac{1}{2} + \$110.74875 =$
 $\$638.12375$ = amount.(4) $\$93.50$ 6 $\$5.6100$ 2 $\$11.22$ = int. $\$93.50 + \$11.22 = \$104.72$
= amount.(2) $\$217.25$ 8 $\$17.3800$ 2 $\$34.76$ = int. $\$217.25 + \$34.76 =$ $\$252.01$ = amt.(5) $\$75.75$ 7 $\$5.3025$ 5 $\frac{1}{2}$ $\$10.6050$ 2.65125 $\$13.25625$ = int. $\$75.75 + \$13.25625 =$ $\$89.00625$ = amt.

$$\begin{array}{r} \text{(6)} \quad \text{£} \quad \text{s. d.} \\ 62 \quad 18 \quad 9\frac{1}{2} \\ \hline \quad \quad \quad 8 \end{array}$$

$$\begin{array}{r} 503 \quad 10 \quad 4 \\ \hline \quad \quad \quad 3\frac{1}{2} \end{array}$$

$$\begin{array}{r} 1510 \quad 11 \quad 0 \\ \hline 251 \quad 15 \quad 3 \end{array}$$

$$\begin{array}{r} \text{£}1762 \quad 7 \quad 2 \\ \hline \quad \quad 20 \end{array}$$

$$\begin{array}{r} 12 \cdot 47 \text{s.} \\ \hline \quad \quad 12 \end{array}$$

$$\begin{array}{r} 5 \cdot 66 \text{d.} \\ \hline \quad \quad 4 \end{array}$$

$$2 \cdot 64 \text{q.}$$

$$\begin{array}{l} \text{£}17 \text{ 12s. } 5\frac{1}{2} \text{d.} = \text{interest.} \quad 12 : 8 :: \$54.72 : \text{int. for 8} \\ \text{£}62 \text{ 18s. } 9\frac{1}{2} \text{d.} + \text{£}17 \text{ 12s. } 5\frac{1}{2} \text{d.} \quad \text{mos.; } \$ \frac{54.72 \times 8}{12} = \$36.48. \\ = \text{£}80 \text{ 11s. } 3 \text{d.} = \text{amt.} \end{array}$$

$$\begin{array}{r} \text{(9)} \quad \text{£}7500 \\ \hline \quad \quad 3\frac{1}{8} \end{array}$$

$$\begin{array}{r} 22500 \\ \hline 937.5 \end{array}$$

$$\text{£}234 \cdot 375$$

$$\begin{array}{r} \text{£}234 \cdot 375 \\ \hline \quad \quad 174 \end{array}$$

$$\begin{array}{r} 937500 \\ 1640625 \\ \hline 234375 \end{array}$$

£40781·250, or £40781 5s.;
(Continued on next page.)

$$\begin{array}{r} \text{(7)} \quad \$1075.75 \\ \hline \quad \quad 8 \end{array}$$

$$\begin{array}{r} \$86 \cdot 0600 \\ \hline \quad \quad 4\frac{1}{2} \end{array}$$

$$\begin{array}{r} \$344.24 \\ \hline 21 \cdot 515 \end{array}$$

$$\$365 \cdot 755 = \text{int.}$$

$$\$1075.75 + \$365 \cdot 755 =$$

$$\$1441 \cdot 505 = \text{amt.}$$

$$\begin{array}{r} \text{(8)} \quad \$684.00 \\ \hline \quad \quad 8 \end{array}$$

$$\begin{array}{r} \$54 \cdot 7200 \\ \hline \quad \quad 5 \end{array}$$

$$\$273.60$$

$$= \text{interest.} \quad \$54.72 : 8 :: \$54.72 : \text{int. for 8}$$

$$\$273.60 + \$36.48 = \$310.08$$

$$= \text{interest.}$$

$$\$684.00 + \$310.08 =$$

$$\$994.08 = \text{amt.}$$

No. of days from May 5th
to October 26th = 174.

$$365 : 174 :: \text{£}234 \cdot 375 : \text{interest reqd.} \therefore \text{Int. reqd.}$$

$$= \text{£} \frac{234 \cdot 375 \times 174}{365};$$

£ s. £ s. d.
 865 (40781 5 (111 14 7 $\frac{1}{3}$ = interest.
 865

£7500 + £111 14s. 7 $\frac{1}{3}$ d. =
 £7611 14s. 7 $\frac{1}{3}$ d. = amt.

428
 865

631
 865

1675
 1460

266
 20

215
 12

5325
 865

2580
 2555

1675

$\frac{25}{308} = \frac{1}{12}$

(10) £ s. d.
 4865 11 5
 5 $\frac{1}{2}$

24327 17 1
 1824 11 9 $\frac{1}{2}$

26152 8 10 $\frac{1}{2}$ + 100 = £261 10s. 5.86375d. ;

Number of days from Jan. 1st to Aug. 28th, 1868 =
 240. 366 : 240 :: £261 10s. 5.86375d. : interest req^d.

∴ Interest req^d. = £ $\frac{261 \text{ 10s. } 5.86375\text{d} \times 240}{366}$ = £171 9s.

9.94d. Amount = £4865 11s. 5d. + £171 9s. 9.94d. =
 £5037 1s. 2.94d.

(11) Interest = amt. - principal = \$994.56 - \$672.00
 = \$322.56. Interest on \$672.00 at 8 per cent. for one
 year = \$53.76.

Hence, \$53.76 : \$322.56 :: 1 year : time required.

∴ Time required = $\frac{32256 \times 1}{5376}$ years = 6 years.

(12) \$816 : 100 :: $\frac{1}{2}$ of \$346.80 : rate required.

∴ Rate required = $\frac{6936 \times 100}{816}$ = 8 $\frac{1}{2}$.

(13) £100 will amount in 15 months at 5 per cent. to £106 5s. Hence, £106 5s. : £138 2s. 6d. (given amt.)
 $\therefore$ £100 : sum required.

$$\therefore \text{Sum required} = \frac{100 \times 33150}{25500} = £130.$$

	£	fl.	c.	m.
(14)	578	3	1	2½
				2½

1156	6	2	50
289	1	5	625

1445	7	8	125
			2½

2891	5	6	250
361	4	4	53125

$$£32.53 \ 0 \ 0 \ 78125 = £32 \ 5\text{fl.} \ 3\text{c.} \ 0.078125\text{m.}$$

(15) \$2293.75 : \$100 $\therefore$ $\frac{1}{4}\%$ of \$2293.75 : rate req^d.

$$\therefore \text{Rate required} = \frac{91.75 \times 100}{2293.75} = 4.$$

Ex. LXXI. (p. 130.)

(2) \$742
 8

$$\begin{aligned} \$59.36 &= \text{int. for 1}^{\text{st}} \text{ yr.} \\ \therefore \$801.36 &= 2^{\text{nd}} \text{ principal.} \end{aligned}$$

(1) \$800
 7

$$\begin{aligned} \$56.00 &= \text{int. for 1}^{\text{st}} \text{ yr.} \\ \therefore \$856.00 &= 2^{\text{nd}} \text{ principal.} \end{aligned}$$

$$\begin{aligned} \$59.92 &= \text{int. for 2}^{\text{nd}} \text{ yr.} \\ \therefore \text{Comp. int.} &= \$56.00 + \\ \$59.92 &= \$115.92. \quad \text{Amt.} = \\ \$800 + \$115.92 &= \$915.92. \end{aligned}$$

$$\begin{aligned} \$69.237504 &= \text{int. for 3}^{\text{rd}} \text{ yr.} \\ \therefore \text{Comp. int.} &= \$59.36 + \\ \$64.1088 &+ \$69.237504 = \\ \$192.70 +. \quad \text{Amt.} &= \$742 + \\ \$192.70 + &= \$934.70 +. \end{aligned}$$

$$(3) \begin{array}{r} \$560 \\ 10 \end{array}$$

$$\$56.00 = \text{int. for 1}^{\text{st}} \text{ yr.}$$

$$\therefore \$616.00 = 2^{\text{nd}} \text{ principal.}$$

$$10$$

$$\$61.60 = \text{int. for 2}^{\text{nd}} \text{ yr.}$$

$$\therefore \$677.60 = 3^{\text{rd}} \text{ principal.}$$

$$10$$

$$\$67.76 = \text{int. for 3}^{\text{rd}} \text{ yr.}$$

$$\therefore \$745.36 = 4^{\text{th}} \text{ prin}^{\text{l}}.$$

$$10$$

$$\$74.536 = \text{int. for 4}^{\text{th}} \text{ yr.}$$

$$\therefore \$819.896 = 5^{\text{th}} \text{ principal.}$$

$$10$$

$$\$81.9896 = \text{int. for 5}^{\text{th}} \text{ year.}$$

$$\$81.9896$$

$$\$74.536$$

$$\$67.76$$

$$\$61.60$$

$$\$56.00$$

$$\$341.8856 = \text{comp. int.,}$$

$$\text{or } \$341.88 + . \text{ Am}^{\text{t}} = \$341.88$$

$$+ \$560 = \$901.88 + .$$

(4)

$$1^{\text{st}} \text{ pay't of int.} = \$308.$$

$$\times \frac{1\frac{1}{2}}{100} = \$4.62$$

$$2^{\text{nd}} \text{ pay't of int.} = \$312.62$$

$$\times \frac{1\frac{1}{2}}{100} = \$4.6893$$

$$3^{\text{rd}} \text{ pay't of int.} = \$317.3093$$

$$\times \frac{1\frac{1}{2}}{100} = \$4.7596395$$

$$4^{\text{th}} \text{ pay't of int.} = \$322.1689395$$

$$\times \frac{1\frac{1}{2}}{100} = \$4.8335340925$$

$$5^{\text{th}} \text{ pay't of int.} = \$327.0024735925$$

$$\times \frac{1\frac{1}{2}}{100} = \$4.9050371088875$$

$$6^{\text{th}} \text{ pay't of int.} = \$331.9075107013875 \times \frac{1\frac{1}{2}}{100} = \$4.9786126605208125$$

$$\therefore \text{Comp. interest} = \$28.7861233619083125$$

$$\text{or, } \$28.78 + .$$

$$\therefore \text{Amount} = \$308.00 + \$28.78 + = \$336.78 + .$$

(5)

$$\begin{array}{lcl}
 \text{1st pay't of interest} = \$610. & \times \frac{1}{100} = & \$6.10 \\
 \text{2d pay't of interest} = \$634.40 & \times \frac{1}{100} = & \$6.344 \\
 \text{3d pay't of interest} = \$659.776 & \times \frac{1}{100} = & \$6.59776 \\
 \text{4th pay't of interest} = \$686.16704 & \times \frac{1}{100} = & \$6.8616704
 \end{array}$$

$$\begin{array}{r}
 \therefore \text{Comp. interest} = \$103.6137216 \\
 \underline{\$610.00} \\
 \text{Amount} = \$713.61+.
 \end{array}$$

(6)

$$\begin{array}{lcl}
 \text{1st pay't of int.} - \$1000. & \times \frac{3\frac{1}{2}}{100} = & \$35. \\
 \text{2d pay't of int.} - \$1085. & \times \frac{3\frac{1}{2}}{100} = & \$36.225 \\
 \text{3d pay't of int.} - \$1071.225 & \times \frac{3\frac{1}{2}}{100} = & \$37.492875 \\
 \text{4th pay't of int.} - \$1103.717875 & \times \frac{3\frac{1}{2}}{100} = & \$38.805125625 \\
 \text{5th pay't of int.} - \$1147.523000625 & \times \frac{3\frac{1}{2}}{100} = & \$40.163305091875 \\
 \text{6th pay't of int.} - \$1187.68690594375 & \times \frac{3\frac{1}{2}}{100} = & \$41.56902070453125
 \end{array}$$

$$\begin{array}{r}
 \therefore \text{Comp. interest} = \$229.25532635140625 \\
 \text{or, } \$229.25 +.
 \end{array}$$

$$\text{Amount} = \$1000 + 229.25 \dots = \$1229.25\dots$$

(7)

$$\begin{array}{rcl}
 & & \text{£62.678} \\
 & & \text{£61.60} \\
 \text{①) } & \text{£880} & \\
 & 3\frac{1}{2} & \\
 \hline
 & 2640 & \\
 & 440 & \\
 \hline
 & \text{£30.80} & \\
 & 2 & \\
 \hline
 & \text{£61.60} = \text{simple int.} &
 \end{array}$$

$$\begin{array}{r}
 \text{£1.078} \\
 20 \\
 \hline
 1.560s. \\
 12 \\
 \hline
 6.72d. \\
 4 \\
 \hline
 2.88q.
 \end{array}$$

$$\text{£1 1s. 6}\frac{1}{2}\text{d. } .88q.$$

(Continued on next page.)

(7 continued.)

⁽¹⁾ £8803½

£30·8 = int. for 1st yr.

∴ £910·8 = 2d principal.

3½£31·878 = int. for 2nd yr.

£30·8 + £31·878 = comp. int.

= £62·678.

⁽²⁾ £1431·254

£57·2500

8

£171·75 = simp. int.

£1431·25

4

£57·25 = int. for 1st yr.

∴ £1488·5 = 2d principal.

4

£59·54 = int. for 2d yr.

∴ £1548·04 = 3d principal.

4

£61·9216 = int. for 3d yr.

£59·54

£57·25

£6 19s. 2½d. 136q.

£178·7116 = comp. interest.

Ex. LXXII. (p. 133.)

(1) \$108 : \$216 :: \$100 : present worth.

∴ Present worth = \$ $\frac{100 \times 216}{108}$ = \$200.

(2) \$121 : \$968 :: \$100 : present worth.

∴ Present worth = \$ $\frac{100 \times 968}{121}$ = \$800.

(3) \$103 : \$1236 :: \$100 : present worth.

∴ Present worth = \$ $\frac{100 \times 1236}{103}$ = \$1200.

(4) \$107.50 : \$225.25 :: \$100 : present worth.

$$\therefore \text{Present worth} = \$ \frac{100 \times 225.25}{107.50} = \$209.53+.$$

(5) \$117.50 : \$1057.50 : \$100 : present worth.

$$\therefore \text{Present worth} = \$ \frac{100 \times 1057.50}{117.50} = \$900.$$

(6) £125 : £161 13s. 5½d. :: £100 : present worth.

$$\therefore \text{Present worth} = £ \frac{100 \times 155205}{120000} = £129 \text{ 6s. 9d.}$$

(7) £107 18s. 4d. : £193 17s. 4½d. :: £100 : present worth.

$$\therefore \text{Present worth} = £ \frac{100 \times 186113}{103600} = £179 \text{ 12s. } 10\frac{1}{2}\text{d. } 2\frac{2}{3}\text{q.}$$

(8) £100 8s. 5¾d. : £458 8s. 9½d. :: £100 : present worth.

$$\therefore \text{Present w'th} = £ \frac{100 \times \frac{440101}{4}}{1759440} = £ \frac{440101 \times 100 \times 73}{4 \times 1759440} = £456 \text{ 9s. } 11\frac{1}{2}\text{d. } 7\frac{1}{3}\frac{2}{3}\text{q.}$$

(9) \$124 : \$217 :: \$24 : discount.

$$\therefore \text{Discount} = \$ \frac{217 \times 24}{124} = \$42.$$

(10) \$110.50 : \$221 :: \$10.50 : discount.

$$\therefore \text{Discount} = \$ \frac{1050 \times 221}{11050} = \$2100.$$

(11) \$105 : \$2000 :: \$5 : discount.

$$\therefore \text{Discount} = \$ \frac{5 \times 2000}{105} = \$95.23\frac{1}{2}.$$

(12) \$106 : \$1750 :: \$6 : discount.

$$\therefore \text{Discount} = \$ \frac{6 \times 1750}{106} = \$99.05\frac{1}{2}.$$

(13) £100 18s. 10 $\frac{1}{2}$ d. : £345 16s. 3d. :: 18s. 10 $\frac{1}{2}$ d.
: discount.

$$\therefore \text{Dis't} = \frac{16512 \times 6058635}{1768512} d. = \frac{16512 \times 6058635 \times 73}{73 \times 73 \times 1768512} d. =$$

$$2137470 d. = £3 4s. 6\frac{1}{2}d. 5\frac{1}{2}q.$$

(14) £100 $\frac{1}{2}$: £549 :: £ $\frac{1}{2}$: discount.

$$\therefore \text{Discount} = £ \frac{40077 \times 32}{7382 \times 73 \times 73} = £2 7s.$$

11d. $\frac{1}{2}$ q.

Also, £100 : £549 :: £ $\frac{1}{2}$: interest on £549.

$$\therefore \text{Interest} = £ \frac{549 \times 32}{100 \times 73} = £2 8s. 1\frac{1}{2}d. \frac{1}{2}q.$$

$$£2 8s. 1\frac{1}{2}d. \frac{1}{2}q. - £2 7s. 11d. \frac{1}{2}q. = 2\frac{1}{2}d. \frac{1}{2}q.$$

(15) £100 $\frac{1}{2}$: £450 :: £ $\frac{1}{2}$: discount.

$$\therefore \text{Discount} = £ \frac{32850 \times 73 \times 45}{7345 \times 73 \times 73} = £2 15s.$$

1 $\frac{1}{2}$ d.

Also, £100 : £450 :: £ $\frac{1}{2}$: interest.

$$\therefore \text{Interest} = £ \frac{450 \times 45}{100 \times 73} = £2 15s. 5\frac{1}{2}d.$$

$$£2 15s. 5\frac{1}{2}d. - £2 15s. 1\frac{1}{2}d. = 4\frac{1}{2}d.$$

(16) In 18 months the tradesman allows 5s. or 8s. 4d. per year on £3 6s. 8d., that is $\frac{1}{20}$ of the whole.

$$\text{Then } 1 : \frac{1}{20} :: 100 : \text{rate of discount. } \therefore \text{Rate} = \frac{100 \times 1}{1 \times 20} = 5 \text{ per cent.}$$

Ex. LXXIII. (p. 137.)

(1) \$126.50 : \$527.25 :: \$100 : amount required.

$$\therefore \text{Amount req'd.} = \$ \frac{52725 \times 100}{12650} = \$416.79+.$$

(2) \$102.50 : \$800 :: \$100 : amount required.

$$\therefore \text{Amount required} = \$ \frac{800 \times 100}{102.50} = \$780.48\frac{1}{2}.$$

(3) \$100 : \$1556 :: \$98 : required value.

$$\therefore \text{Value} = \$ \frac{98 \times 1556}{100} = \$1524.88.$$

(4) \$99 : \$525.50 :: \$7 : required income.

$$\therefore \text{Required income} = \$ \frac{52550 \times 7}{99} = \$27.15\frac{5}{9}.$$

(5) \$7\frac{1}{2} : \$900 :: \$125\frac{1}{3} : income required.

$$\therefore \text{Income} = \$ \frac{5023 \times 900 \times 2}{15 \times 40} = \$15069.$$

(6) \$100 : \$2140 :: \$65 : amount required.

$$\therefore \text{Amount required} = \$ \frac{65 \times 2140}{100} = \$1391.$$

(7) (1) £90\frac{7}{8} : £666 8s. 3d. :: £3 : gross income.

$$\therefore \text{Income} = £ \frac{666 \text{ 8s. 3d.} \times 3}{90\frac{7}{8}} = £22.$$

Income tax = (22 × 4)d. = 88d. = 7s. 4d. Net income = £22 - 7s. 4d. = £21 12s. 8d. Half-yearly gain = £21 12s. 8d. ÷ 2 = £10 16s. 4d.

(2) Income tax on £100 = (100 × 4)d. = 400d. = £1 13s. 4d.;
 $\therefore$ £100 income would yield £100 - £1 13s. 4d. = £98 6s. 8d., or £98\frac{1}{2}. Hence, £90\frac{7}{8} : £98\frac{1}{2} :: £3 : req^d. rate.

$$\therefore \text{Req^d. rate} = £ \frac{3 \times 98\frac{1}{2}}{90\frac{7}{8}} = £ \frac{3 \times 295 \times 8}{3 \times 727} = £3 \text{ 4s. 11}\frac{67}{727}\text{d.}$$

(8) £136 : £100 :: £8 : required rate.

$$\therefore \text{Rate required} = \frac{8 \times 100}{136} = 5.88 + \text{ or nearly 6 per ct.}$$

(9) £136 : £100 :: £8 : Int. received from B of Montreal.

$$\therefore \text{Rate of Interest} = \frac{100 \times 8}{136} = 5.88 +$$

£104 : £100 :: £7.5 : Int. received from B of Toronto.

$$\therefore \text{Rate of Interest} = \frac{7.5 \times 100}{104} = 7.21 +$$

Therefore the Bank of Toronto is the better investment.

(10) £93 : £4650 :: £100 : quantity of 3 per cent. stock bought.

$$\therefore \text{Quantity of stock bought} = £ \frac{4650 \times 100}{93} = £5000.$$

The stock stood at 93: now having fallen $\frac{1}{4}$ per cent., it stands at 92 $\frac{1}{4}$.

$\therefore 100 : 5000 :: 92\frac{1}{4} : \text{value of stock.}$

$$\therefore \text{Value of stock} = £ \frac{5000 \times 92\frac{1}{4}}{100} = £4625$$

$$\therefore \text{Loss of property} = £4650 - £4625 = £25.$$

(11) £90 $\frac{1}{4}$: £99 $\frac{1}{4}$:: £29000 : quantity of 3 per cent. stock.

$$\therefore \text{Quantity of 3 per cent stock} = £ \frac{29000 \times 99 \times 8}{725} = £31680.$$

$$\text{1st income} = £ \frac{29000 \times 3\frac{1}{4}}{100} = £1015$$

$$\text{2d income} = £ \frac{31680 \times 8}{100} = £950 \text{ 8s.}$$

$$\therefore \text{Loss} = £1015 - £950 \text{ 8s.} = £64 \text{ 12s}$$

(12) \$115 : \$2000 :: \$8 : gain.

$$\therefore \text{Gain} = \$ \frac{2000 \times 8}{115} = \$139\frac{1}{3}.$$

(13) £100 : £95 :: £5000000 : value of in. £5000000 in 3 per cts.

$$\therefore \text{Value} = £ \frac{5000000 \times 95}{100} = £4750000.$$

$$\text{Amount still due} = £5016000 - £4750000 = £266000.$$

£3 : £3 $\frac{1}{4}$:: £95 : value of the 3 $\frac{1}{4}$ per cents.

$$\therefore \text{Value} = £ \frac{3\frac{1}{4} \times 95}{3} = £110\frac{5}{6}.$$

£110 $\frac{5}{6}$: £100 :: £266000 : amount of 3 $\frac{1}{4}$ per cent. stock.

$$\therefore \text{Amount of 3}\frac{1}{4} \text{ stock} = £ \frac{266000 \times 100}{110\frac{5}{6}} = £240000$$

(14) £93½ : £18700 :: £3½ : income.

$$\therefore \text{Income} = £ \frac{18700 \times 3\frac{1}{2}}{93\frac{1}{2}} = £700.$$

½ of £18700 = £9350; ¼ of £18700 = £4675;

∴ £96 : £9350 :: £4 : income from 1st investment.

$$\therefore \text{Income} = £ \frac{9350 \times 4}{96} = £155 \text{ 16s. 8d.}$$

£90 : £4675 :: £3 : income from 2d investment.

$$\therefore \text{Income} = £ \frac{4675 \times 3}{90} = £498 \text{ 13s. 4d.};$$

$$\therefore \text{total income} = £155 \text{ 16s. 8d.} + £498 \text{ 13s. 4d.} = £654 \text{ 10s.}$$

$$\text{Hence loss} = £700 - £654 \text{ 10s.} = £45 \text{ 10s.}$$

This question may be solved by obtaining the am't of stock in each case and then the incomes.

(15) £91 : £5460 :: £100 : am't of 3 per cent. st'k.

$$\therefore \text{Amount} = £ \frac{100 \times 5460}{91} = £6000.$$

£100 : £93½ :: £2000 : produce from 1st sale.

$$\therefore \text{Produce} = £ \frac{2000 \times 93\frac{1}{2}}{100} = £1870.$$

£100 : £85 :: £4000 : produce from 2d sale.

$$\therefore \text{Produce} = £ \frac{4000 \times 85}{100} = £3400;$$

∴ total amount realized = £3400 + £1870 = £5270.

£102 : £5270 :: £100 : amount of 4½ per cent. st'k.

$$\therefore \text{Amount} = £ \frac{5270 \times 100}{102} = £5166 \text{ 13s. 4d.}$$

$$\text{Income from 3 per cent. stock} = £ \frac{6000 \times 3}{100} = £180.$$

$$\text{Income from 4½ per ct. st'k} = £ \frac{5166 \text{ 13s. 4d.} \times 4\frac{1}{2}}{100} =$$

£232 10s.

$$\therefore \text{Gain} = £232 \text{ 10s.} - £180 = £52 \text{ 10s.}$$

(16) £3 : £350 :: £100 : is to amount invested in 3 per cents.

$$\therefore \text{Amount invested} = \text{£} \frac{100 \times 350}{3} = \text{£}11666\frac{2}{3}$$

£100 : £11666 $\frac{2}{3}$:: £87 $\frac{1}{2}$: value of 3 per cent. stock.

$$\therefore \text{Value} = \text{£} \frac{349 \times 35000}{100 \times 3 \times 4} = \text{£}10179\frac{1}{2}$$

£104 $\frac{1}{2}$: £10179 $\frac{1}{2}$:: £5 : income from 5 per cents.

$$\therefore \text{income from 5 per cents} = \text{£} \frac{5 \times 61075 \times 8}{839 \times 3} =$$

£485 5s. 11 $\frac{1}{2}$ d. $\frac{897}{333}$ q.

$$\text{£}485 \text{ 5s. } 11\frac{1}{2}\text{d. } \frac{897}{333}\text{q.} - \text{£}350 = \text{£}135 \text{ 5s. } 11\frac{1}{2}\text{d. } \frac{897}{333}\text{q.}$$

Ex. LXXIV. (p. 141.)

(1) \$100 : \$4300 :: $\frac{1}{100}$: commission required.

$$\therefore \text{Commission} = \$ \frac{4300 \times \frac{1}{100}}{100} = \$5.37\frac{1}{2}$$

(2) \$100 : \$9626.55 :: \$2.60 : premium required.

$$\therefore \text{Premium required} = \$ \frac{2.60 \times 9626.55}{100} = \$250.2903.$$

(3) \$1560 stock : \$100 stock :: \$4.60 : per cent.

$$\therefore \text{Per cent.} = \frac{4.60 \times 100}{1560} = \$\frac{1150}{3900} = 29\frac{1}{3} \text{ cts.}$$

per cent.

(4) \$2.40 : \$100 :: \$45.60 : sum required.

$$\therefore \text{Sum required} = \$ \frac{45.60 \times 100}{2.40} = \$1900.$$

(5) 25 yds. $\times$ 36 = 900 yds. : 900 yds. at 10 $\frac{1}{2}$ d per yd. = £39 7s. 6d.

(1) £39 7s. 6d. - (£32 16s. 3d. + 6s. 3d.) = £6 5s. = whole gain.

(2) £33 2s. 6d. : £100 :: £6 5s. : required gain per cent.

$$\therefore \text{gain per cent.} = \frac{24000 \times 125}{7950} \text{ s.} = \text{£}18 \text{ 17s. } 2\frac{1}{2}\text{d. } \frac{11}{3}\text{q.}$$

(6) Cost of 1280 bus. at \$1.20 per bus. = \$1536.00

(¹) $(1280 \times 3\frac{1}{2})$ cts. = carriage etc. expenses = \$48.00.

Total expenses = \$1536.00 + \$48.00 = \$1584.00.

1280 bus. at \$1.40 per bushel = \$1792 = selling price.

$\therefore$ Gain = \$1792 - \$1584 = \$208;

(²) \$1584 : \$100 :: \$208 : gain per cent.

$\therefore$ Gain per cent. = $\$ \frac{100 \times 208}{1584} = \$13\frac{1}{3}$

(³) Also to have gained \$400 he should have sold the wheat for \$1584 + \$400 = \$1984.

And \$1984 ÷ 1280 = \$1.55 = required price per bus.

(7) (¹) If he buys for 6s. 8d. and sells for 7s. 4d. he gains 8d.

$\therefore$ 6s. 8d. : 100d. :: 8d. : required gain per cent.

$\therefore$ Gain per cent. = $\frac{8 \times 100}{80} = 10$ per cent.

Also if he buys for 7s. 4d. and sells for 6s. 8d. he loses 8d.

(²) $\therefore$ 7s. 4d. : 100d. :: 8d. : required loss per cent.

$\therefore$ Loss per cent. = $\frac{8 \times 100}{88} = 9\frac{1}{11}$ per cent. = £9 1s.

9 $\frac{1}{11}$ d. $\frac{1}{11}$ q.

(8) If it cost \$96 per cwt. the price per lb. will be 96 cents.

$\therefore$ \$100 : \$125 :: 96 cents : price required.

$\therefore$ Price required = $\frac{96 \times 125}{100}$ cents = \$120

(9) \$6 per cwt. = 6 cents per lb.

$\therefore$ Gain per lb. = (10 - 6)d. = 4 cents.

6 cents : \$100 :: 4 cents : gain per cent.

$\therefore$ Gain per cent. = $\frac{10000 \times 4}{6} = \$66.66\frac{2}{3} = 66\frac{2}{3}$ per ct.

(10) £100 : 112 $\frac{1}{2}$:: 4s. 8d. : required price.

$\therefore$ Required price = $\frac{56 \times 112\frac{1}{2}}{100}$ d. = 63d. = 5s. 3d.

(11) £112½ : 4s. 8d. :: £1000 : prime cost.

$$\therefore \text{Prime cost} = \frac{24000 \times 56}{27000} \text{d.} = 4\text{s. } 1\frac{1}{2}\text{d. } \frac{1}{4}\text{q.}$$

(12) 40 lbs. @ 84c. = \$33.60

44 lbs. @ 93c. = \$40.92

55 lbs. @ \$1.08 = \$59.40

Total cost = \$133.92

$\therefore$ Gain = \$188.16 - \$133.92 = \$54.24.

\$133.92 : \$100 :: \$54.24 : required gain per cent.

$$\therefore \text{Gain} = \frac{100 \times 54.24}{133.92} = 40\frac{1}{4}\frac{2}{3} \text{ per cent.}$$

(13) 26 lbs. @ 5s. 3d. cost £6 16s. 6d.

32 lbs. @ 5s. 7d. cost £8 18s. 8d.

36 lbs. @ 6s. 1d. cost £10 19s.

$\therefore$ 94 lbs. cost £26 14s. 2d.

£100 : £40 :: £26 14s. 2d. : gain.

$$\therefore \text{Gain} = \frac{6410 \times 40}{100} \text{d.} = £10 \text{ 13s. 8d.}$$

$\therefore$ Selling price will be £26 14s. 2d. + £10 13s. 8d. = £37 7s. 10d.

$\therefore$ Price per lb. will be £37 7s. 10d. $\div$ 94 = 7s. 11½d. ¼q.

(14) £90 : £100 :: 15s. : buying price.

$$\therefore \text{Buying price} = \frac{15 \times 100}{90} \text{s.} = 16\text{s. 8d.}$$

£100 : £110 :: 16s. 8d. : required selling price.

$$\therefore \text{Required price} = \frac{200 \times 110}{100} \text{d.} = 220\text{d.} = 18\text{s. 4d.}$$

(15) He gains on 11 eggs the price of 7 eggs.

$\therefore$ 11 : 7 :: £100 : required gain.

$$\therefore \text{Gain} = \frac{100 \times 7}{11} = £63 \text{ 12s. } 8\frac{1}{2}\text{d. } \frac{1}{4}\text{q.}$$

(16) \$130 : \$100 :: \$1.56 : cost price.

$$\therefore \text{Cost price} = \$ \frac{1.56 \times 100}{130} = \$1.20.$$

Ex. LXXV. (p. 142.)

(1)	(2)	(3)
104	\$4.25	87.8
96	\$5.75	87.7
92	\$6.00	87.6
90	\$7.80	86.8
82	\$3.50	85.0
81	\$5.58	84.5
6) 545	6) \$33.48	83.8
		72.0
90.83	\$5.58	77.9
		77.6
		10) 836.7
		83.67

(4)

United ages of 17 children = 102 years.

United ages of 26 children = 195 years.

United ages of 35 children = 323.75 years.

United ages of 20 children = 200 years.

United ages of 8 children = 98 years.

 $\therefore$ United ages of 106 = 918.75 years. $\therefore$ Average age = $918.75 \text{ years} \div 106 = 8.667 \dots \text{ years.}$

(5)

United ages of 27 men = 1539 years.

United ages of 11 men = 583 years.

United ages of 8 men = 474 years.

 $\therefore$ United ages of 19 men = 1057 years. $\therefore$ The united ages of the remaining 8 men = $(1539 - 1057) \text{ years} = 482 \text{ years.}$ $\therefore$ The average age = $482 \div 8 = 60\frac{1}{4} \text{ years.}$

(5) $100 : 112 :: 31526 : \text{population of 1st in 1861.}$

$$\therefore \text{Population} = \frac{31526 \times 112}{100} = 35085.12.$$

$100 : 110 :: 42324 : \text{population of 2d in 1861.}$

$$\therefore \text{Population} = \frac{42324 \times 110}{100} = 46556.4.$$

$100 : 82 :: 6706 : \text{population of 3d in 1861.}$

$$\therefore \text{Population} = \frac{6706 \times 82}{100} = 5498.92.$$

$\therefore \text{United population in 1861} = 35085.12 + 46556.4 + 5498.92 = 87140.44.$

$$\therefore \text{Average population} = 87140.44 \div 3 = 29046.813.$$

(7) Whole gain from 1853 to 1863 = £184 11s. 6d. $\times$ 11 = £2030 6s. 6d.

£2030 6s. 6d. + £151 9s. 10d. = whole gain = £2181 16s. 4d.

£2181 16s. 4d. - £76 8s. 4d. = £2105 8s. = whole gain during 11 years. $\therefore$ Average gain = £2105 8s. $\div$ 11 = £191 8s.

Ex. LXXVI. (p. 145.)

(1) $(^1) 2+3+4 = 9.$

$9 : 12 :: 1008 : \text{1st part.}$

$$\therefore \text{1st part} = \frac{1008 \times 2}{9} = 224.$$

$9 : 3 :: 1008 : \text{2d part.}$

$$\therefore \text{2d part} = \frac{1008 \times 3}{9} = 336.$$

$9 : 4 :: 1008 : \text{3d part.}$

$$\therefore \text{3d part} = \frac{1008 \times 4}{9} = 448.$$

(2) $5+11+16 = 32.$

$32 : 5 :: \$260 : \text{1st part.}$

$$\therefore \text{1st part} = \$ \frac{260 \times 5}{32} = \$40.621.$$

(Continued on next page.)

(1 Continued.)

$$32 : 11 :: \$260 : 2d \text{ part.}$$

$$\therefore 2d \text{ part} = \$ \frac{260 \times 11}{32} = \$89.37\frac{1}{2}.$$

$$32 : 16 :: \$260 : 3d \text{ part.}$$

$$\therefore 3d \text{ part} = \$ \frac{260 \times 16}{32} = \$130.$$

$$(^3) 11 : 5 :: 145 \text{ ac., } 3 \text{ ro., } 33 \text{ po.} : \text{share of 1st.}$$

$$\therefore \text{Share of 1st.} = \frac{145 \text{ ac., } 3 \text{ ro., } 33 \text{ po.} \times 5}{11} = 66 \text{ ac.,}$$

1 ro., 15 po.

$$11 : 6 :: 145 \text{ ac., } 3 \text{ ro., } 33 \text{ po.} : \text{share of 2d.}$$

$$\therefore \text{Share of 2d} = \frac{145 \text{ ac., } 3 \text{ ro., } 33 \text{ po.} \times 6}{11} = 79 \text{ ac., } 2 \text{ ro.,}$$

18 po.

$$(^4) \frac{1}{2} + \frac{1}{3} + \frac{1}{4} + \frac{1}{5} = \frac{77}{60}.$$

$$\frac{77}{60} : \frac{1}{2} :: £110 : \text{share of 1st.}$$

$$\therefore \text{Share of 1st.} = £ \frac{110 \times 60}{77 \times 2} = £42 \text{ 17s. } 1\frac{1}{2}\text{d. } \frac{2}{3}\text{q.}$$

$$\frac{77}{60} : \frac{1}{3} :: £110 : \text{share of 2d.}$$

$$\therefore \text{Share of 2d} = \frac{110 \times 60}{77 \times 3} = £28 \text{ 11s. } 5\frac{1}{2}\text{d.}$$

$$\frac{77}{60} : \frac{1}{4} :: £110 : \text{share of 3d.}$$

$$\therefore \text{Share of 3d} = £ \frac{110 \times 60}{77 \times 4} = £21 \text{ 8s. } 6\frac{1}{2}\text{d. } \frac{2}{3}\text{q.}$$

$$\frac{77}{60} : \frac{1}{5} :: £110 : \text{share of 4th.}$$

$$\therefore \text{Share of 4th} = £ \frac{110 \times 60}{77 \times 5} = £17 \text{ 2s. } 10\frac{1}{2}\text{d. } \frac{1}{3}\text{q.}$$

$$(2) (^1) \$320 + \$560 + \$720 = \$1600.$$

$$\$1600 : \$320 :: \$680 : A's \text{ share of the gain.}$$

$$\therefore A's \text{ share} = \$ \frac{680 \times 320}{1600} = \$136.$$

$$\$1600 : \$560 :: \$380 : B's \text{ share of the gain.}$$

$$\therefore B's \text{ share} = \$ \frac{680 \times 560}{1600} = \$238.$$

(Continued on next page.)

(2 continued.)

\$1600 : \$720 :: \$680 : *O*'s share of the gain.

$$\therefore O's \text{ share} = \$ \frac{680 \times 720}{1600} = \$306.$$

(*) £175 + £210 + £265 = £650.

£650 : £210 :: £422 10s. : *O*'s share.

$$\therefore O's \text{ share} = £ \frac{422\frac{1}{2} \times 210}{650} = £136 \text{ 10s.}$$

(3) 48·856 + 43·265 = 92·121.

100 - 92·121 = 7·879 = per centage of hydrogen.

100 : 48·856 :: 2240 : No. of lbs. of oxygen.

$$\therefore \text{Lbs. of oxygen} = \frac{2240 \times 48·856}{100} = 1094·3744.$$

100 : 43·265 :: 2240 : No. of lbs. of carbon.

$$\therefore \text{Lbs. of carbon} = \frac{2240 \times 43·265}{100} = 969·136.$$

100 : 7·879 :: 2240 : No. of lbs. of hydrogen.

$$\therefore \text{No. of lbs. of hydrogen} = \frac{2240 \times 7·879}{100} = 176·4896$$

(4) 3 : 2 :: 100 : per centage of gold.

$$\therefore \text{Per centage of gold} = \frac{100 \times 2}{3} = 66\frac{2}{3}.$$

3 : 1 :: 100 : per centage of silver.

$$\therefore \text{Per centage of silver} = \frac{100 \times 1}{3} = 33\frac{1}{3}.$$

$$(5) \text{ Equated time} = \frac{150 \times 2 + 210 \times 6 + 120 \times 7}{150 + 210 + 120} = 5 \text{ mos.}$$

$$(6) \text{ Equated time} = \frac{(1000 \times 6) - (400 \times 3)}{1000 - 400} = 8 \text{ mos.}$$

(7) \$4000 × 2 = \$8000 = *A*'s contribution.\$300 × 2 + 300 × 1½ = \$1050 = *B*'s contribution.\$200 × 2 + 500 × 1 = \$900 = *C*'s contribution.

\$8000 + \$1050 + \$900 = \$9950.

\$9950 : \$3000 :: \$7960 : *A*'s share of the gain.

$$\therefore A's \text{ share} = \$ \frac{7960 \times 8000}{9950} = \$6400.$$

(Continued on next page.)

(7 continued.)

\$9950 : \$1050 :: \$7960 : B's share of the gain.

$$\therefore B's \text{ share} = \frac{1050 \times 7960}{9950} = \$840.$$

\$9950 : \$900 : \$7960 : C's share of the gain.

$$\therefore C's \text{ share} = \$ \frac{7960 \times 900}{9950} = \$720.$$

(8) 10 per cent. of £1600 = £160; £1600 - £160 = £1440.

£6400 : £2400 :: £1440 : A's share of the gain.

$$\therefore A's \text{ share} = £ \frac{2400 \times 1440}{6400} = £540, \text{ which added to } £130 = £700.$$

£6400 : £4000 :: £1440 : B's share of the gain.

$$\therefore B's \text{ share} = £ \frac{1440 \times 4000}{6400} = £900.$$

(9) Since the keep of a horse : the keep of a sheep :: 8 : 1, therefore 20 horses are equivalent to 60 sheep.

In the same manner 15 oxen are equivalent to 30 sheep.

 $\therefore A$ puts in 60 sheep, B puts in 30 sheep, C puts in 10 sheep.

$$60 + 30 + 10 = 100.$$

100 : 60 :: \$60 : A's share of the rent.

$$\therefore A's \text{ share} = \$ \frac{60 \times 60}{100} = \$36.$$

100 : 30 :: \$60 : B's share of the rent.

$$\therefore B's \text{ share} = \$ \frac{60 \times 30}{100} = \$18.$$

100 : 10 :: \$60 : C's share of the rent.

$$\therefore C's \text{ share} = \$ \frac{60 \times 10}{100} = \$6.$$

(10)

:: V

5 :

:: C

If o

15 pts

pts. =

= (15)

much

48 pts

ber of

(1)

24

(2)

49

(3)

89

(4)

21

22

221

(10) $9 : 10 :: 1\frac{1}{2}$ pts. : widow's share.

$\therefore$ Widow's share $= \frac{1\frac{1}{2} \times 10}{9}$ pts. $= 1\frac{1}{2}$ pts.

$5 : 6 :: 1\frac{1}{2}$ pts. : old man's share.

$\therefore$ Old man's share $= \frac{1\frac{1}{2} \times 6}{5}$ pts. $= 2$ pts.

If one widow receive $1\frac{1}{2}$ pts. 9 will receive $(9 \times 1\frac{1}{2}) = 15$ pts.: similarly 6 single women will receive $(6 \times 1\frac{1}{2})$ pts. $= 9$ pts. $\therefore$ The total amount given to the women $= (15 + 9)$ pts. $= 24$ pts. But the men had twice as much as the women, $\therefore$ the men received (24×2) pts. $= 48$ pts.; and as each man received 2 pts. the total number of men must have been $48 \div 2 = 24$.

Ex. LXXVII. (p. 149.)

$$(1) \begin{array}{r} 196 \text{ (14)} \\ 1 \\ \hline 24 \overline{) 96} \\ \underline{96} \end{array}$$

$$\begin{array}{r} 289 \text{ (17)} \\ 1 \\ \hline 27 \overline{) 189} \\ \underline{189} \end{array}$$

$$\begin{array}{r} 625 \text{ (25)} \\ 4 \\ \hline 45 \overline{) 225} \\ \underline{225} \end{array}$$

$$(2) \begin{array}{r} 841 \text{ (29)} \\ 4 \\ \hline 49 \overline{) 441} \\ \underline{441} \end{array}$$

$$\begin{array}{r} 900 \text{ (30)} \\ 9 \\ \hline 60 \overline{) 00} \\ \underline{00} \end{array}$$

$$\begin{array}{r} 1764 \text{ (42)} \\ 16 \\ \hline 82 \overline{) 164} \\ \underline{164} \end{array}$$

$$(3) \begin{array}{r} 2401 \text{ (49)} \\ 16 \\ \hline 89 \overline{) 801} \\ \underline{801} \end{array}$$

$$\begin{array}{r} 7569 \text{ (87)} \\ 64 \\ \hline 167 \overline{) 1169} \\ \underline{1169} \end{array}$$

$$\begin{array}{r} 9604 \text{ (98)} \\ 81 \\ \hline 188 \overline{) 1504} \\ \underline{1504} \end{array}$$

$$(4) \begin{array}{r} 12421 \text{ (111)} \\ 1 \\ \hline 21 \overline{) 28} \\ \underline{21} \\ 221 \overline{) 221} \\ \underline{221} \end{array}$$

$$\begin{array}{r} 40000 \text{ (200)} \\ 4 \\ \hline 400 \overline{) 0000} \\ \underline{0000} \end{array}$$

$$\begin{array}{r} 388129 \text{ (623)} \\ 36 \\ \hline 122 \overline{) 281} \\ \underline{244} \\ 1243 \overline{) 8729} \\ \underline{8729} \end{array}$$

170

KEY.

[ELEM. ARITH.]

(5) 494209 (708)
49

1408	4209
	4209

582169 (768)
49

146	921
	876
1523	4569
	4569

259081 (509)
25

1009	9081
	9081

(6) 1234321 (1111)

1	
21	23
	21
221	243
	221
2221	2221
	2221

28547649 (5843)

25	
108	354
	309
1064	4576
	4256
10683	82049
	82049

(7) 62504836 (7906)
49

149	1850
	1841
15806	94836
	94836

33016516 (5746)
25

107	801
	749
1144	5265
	4576
11486	68916
	68916

49112064 (7008)
49

14008	112064
	112064

(8) 182493081 (13509)
1

29	89
	69
265	1849
	1825
27009	243081
	243081

47.61 (6.9)
36

12.9	11.61
	11.61

Ex. LXXVII.]

KEY.

171

(9) 008838 (094
00

09	88
	81
184	786
	786

445-336609 (21-103

4

41	45
	41

421	433
	421

42203	126609
	126609

(10) 000633679929 (025173

4

45	283
	225

501	867
	501

5027	86699
	35189

50343	151029
	151029

0000000009 (00003

9

(11) 51-00000000 (7-1414

49

141	200
	141

1424	5900
	5696

14281	20400
	14281

142424	611900
	509696

51000000 (7-141

49

141	200
	141

1424	5900
	5696

14281	20400
	14281

(12) $5 \overline{) 1000000} (2 \cdot 2583$

$$\begin{array}{r}
 4 \\
 42 \overline{) 110} \\
 \underline{84} \\
 445 \overline{) 2600} \\
 \underline{2225} \\
 4508 \overline{) 87500} \\
 \underline{36064} \\
 45163 \overline{) 143600} \\
 \underline{135489}
 \end{array}$$

$05100000 (2 \cdot 258$

$$\begin{array}{r}
 4 \\
 42 \overline{) 110} \\
 \underline{84} \\
 445 \overline{) 2600} \\
 \underline{2225} \\
 4508 \overline{) 87500} \\
 \underline{36064} \\
 1436
 \end{array}$$

(13) $808 \overline{) 52000000} (28 \cdot 03992 \quad 96304 \overline{) 99300000} (310 \cdot 3304$

$$\begin{array}{r}
 4 \\
 48 \overline{) 406} \\
 \underline{384} \\
 563 \overline{) 2252} \\
 \underline{1689} \\
 5669 \overline{) 56300} \\
 \underline{51021} \\
 56789 \overline{) 527900} \\
 \underline{511101} \\
 567982 \overline{) 1679900} \\
 \underline{1135964}
 \end{array}$$

$$\begin{array}{r}
 9 \\
 61 \overline{) 68} \\
 \underline{61} \\
 6203 \overline{) 20499} \\
 \underline{18609} \\
 62063 \overline{) 189030} \\
 \underline{186189} \\
 6206604 \overline{) 28410000} \\
 \underline{24826416}
 \end{array}$$

(14) $333333 (577$

$$\begin{array}{r}
 25 \\
 107 \overline{) 833} \\
 \underline{749} \\
 1147 \overline{) 8433} \\
 \underline{8029}
 \end{array}$$

(16) $41\frac{1}{3} = 4 \cdot 734693 \dots$

$$\begin{array}{r}
 4 \\
 41 \overline{) 73} \\
 \underline{41}
 \end{array}$$

$$\begin{array}{r}
 427 \overline{) 3246} \\
 \underline{2989} \\
 4345 \overline{) 25793} \\
 \underline{21725}
 \end{array}$$

(15) $027777 (166$

$$\begin{array}{r}
 1 \\
 26 \overline{) 177} \\
 \underline{156} \\
 326 \overline{) 2177} \\
 \underline{1956}
 \end{array}$$

(17) $2304 (48$

$$\begin{array}{r}
 16 \\
 88 \overline{) 704} \\
 \underline{704}
 \end{array}$$

$$\begin{array}{r}
 3481 (59 \\
 25
 \end{array}$$

$$\begin{array}{r}
 109 \overline{) 981} \\
 \underline{981}
 \end{array}$$

$\therefore \sqrt{3104} = 55$

$$(18) \quad \begin{array}{r} 44\dot{1} \text{ (21)} \\ 4 \\ \hline 41 \overline{) 41} \\ \underline{41} \end{array} \quad \begin{array}{r} 64 \text{ (8)} \\ 64 \\ \hline \end{array} \quad 21 + 8 = 29$$

(19) 5832 sovereigns = 13996780 pence and 2s. 6d. = 30d.; $\therefore$ the sovereigns were worth (1399680+30) times the box = 46656.

The square root of 46656 is 216; $\therefore$ the sovereigns were worth 216 times the shillings and the shillings were worth 216 times the box. But the value of the box is 2s. 6d.; $\therefore$ the value of the shillings will be 216 times 2s. 6d. or 540 shillings.

Ex. LXXVIII. (p. 152.)

$$(1) \quad \begin{array}{r} 1728 \text{ (12)} \quad 8000 \text{ (20)} \quad 5832 \text{ (18)} \\ 1 \quad 8 \quad 1 \\ \hline \begin{array}{l} 3 \times 1^2 = 3 \\ 3 \times 10^2 = 300 \\ 3 \times 10 \times 2 = 60 \\ 2^2 = 4 \\ \hline 364 \\ 2 \\ \hline 728 \end{array} \quad \begin{array}{l} 728 \\ \hline \end{array} \quad \begin{array}{l} 000 \\ 000 \\ \hline \end{array} \quad \begin{array}{l} 3 \times 1^2 = 3 \\ 3 \times 10^2 = 300 \\ 3 \times 10 \times 8 = 240 \\ 8^2 = 64 \\ \hline 604 \\ 8 \\ \hline 4832 \end{array} \quad \begin{array}{l} 4832 \\ \hline \end{array} \end{array}$$

$$(2) \quad \begin{array}{r} 74088 \text{ (42)} \quad 421875 \text{ (75)} \\ 64 \quad 343 \\ \hline \begin{array}{l} 3 \times 4^2 = 48 \\ 3 \times 40^2 = 4800 \\ 3 \times 40 \times 2 = 240 \\ 2^2 = 4 \\ \hline 5044 \\ 2 \\ \hline 10088 \end{array} \quad \begin{array}{l} 10088 \\ \hline \end{array} \quad \begin{array}{l} 3 \times 7^2 = 147 \\ 3 \times 70^2 = 14700 \\ 3 \times 70 \times 5 = 1050 \\ 5^2 = 25 \\ \hline 15775 \\ 5 \\ \hline 78875 \end{array} \quad \begin{array}{l} 78875 \\ \hline \end{array} \quad \begin{array}{l} 78875 \\ \hline \end{array} \end{array}$$

(Continued on next page.)

(2 continued.)

778688 (92)
729

(3)

912673 (97)
729

$$\begin{array}{r}
 3 \times 9^2 = 243 \\
 3 \times 90^2 = 24300 \\
 3 \times 90 \times 2 = 540 \\
 2^2 = 4 \\
 \hline
 24844 \\
 2 \\
 \hline
 49688
 \end{array}$$

49688

$$\begin{array}{r}
 3 \times 9^2 = 243 \\
 3 \times 90^2 = 24300 \\
 3 \times 90 \times 7 = 1890 \\
 7^2 = 49 \\
 \hline
 26239 \\
 7 \\
 \hline
 183673
 \end{array}$$

183673

183673

1092727 (103) (4)
1134317728 (512)
125

$$\begin{array}{r}
 3 \times 1^2 = 3 \\
 3 \times 10^2 = 300 \\
 3 \times 100^2 = 30000 \\
 3 \times 100 \times 3 = 900 \\
 3^2 = 9 \\
 \hline
 30909 \\
 3 \\
 \hline
 92727
 \end{array}$$

92727

$$\begin{array}{r}
 3 \times 5^2 = 75 \\
 3 \times 50^2 = 7500 \\
 3 \times 50 \times 1 = 150 \\
 1^2 = 1 \\
 \hline
 7651
 \end{array}$$

9217

7651

$$\begin{array}{r}
 3 \times 51^2 = 7803 \\
 3 \times 510^2 = 780300 \\
 3 \times 510 \times 2 = 3060 \\
 2^2 = 4 \\
 \hline
 783364 \\
 2 \\
 \hline
 1566728
 \end{array}$$

1566728

1566728

64481201 (401)
64

$$\begin{array}{r}
 3 \times 4^2 = 48 \\
 3 \times 40^2 = 4800 \\
 3 \times 400^2 = 480000 \\
 3 \times 400 \times 1 = 1200 \\
 1^2 = 1 \\
 \hline
 481201
 \end{array}$$

481201

481201

(5)

444104947 (763
348

$$\begin{array}{r}
 3 \times 7^2 = 147 \\
 3 \times 70^2 = 14700 \\
 3 \times 70 \times 6 = 1260 \\
 6^2 = 36 \\
 \hline
 15996 \\
 3 \times 76^2 = 17328 \\
 3 \times 760^2 = 1732800 \\
 3 \times 760 \times 3 = 6840 \\
 3^2 = 9 \\
 \hline
 1739649 \\
 8 \\
 \hline
 5218947
 \end{array}$$

101194

95976

5218947

5218947

000202262003 (0587
125

$$\begin{array}{r}
 3 \times 5^2 = 75 \\
 3 \times 50^2 = 7500 \\
 [3 \times 50 \times 8 = 1200 \\
 8^2 = 64 \\
 \hline
 8764 \\
 3 \times 58^2 = 10092 \\
 3 \times 580^2 = 1009200 \\
 3 \times 580 \times 7 = 12180 \\
 7^2 = 49 \\
 \hline
 1021429
 \end{array}$$

77262

70112

7150003

7150003

(6)

131 019108039 (5-079)
125

$3 \times 5^3 = 75$	6019108
$3 \times 50^3 = 7500$	
$3 \times 500^3 = 750000$	
$3 \times 500 \times 7 = 10500$	
$7^3 = 49$	
<u>760549</u>	5323843
$3 \times 507^3 = 771147$	695265039
$3 \times 5070^3 = 77114700$	
$3 \times 5070 \times 9 = 136890$	
$9^3 = 81$	
<u>77251671</u>	695265039

F 408518488000 (7420)
343

$3 \times 7^3 = 147$	65518
$3 \times 70^3 = 14700$	
$3 \times 70 \times 4 = 840$	
$4^3 = 16$	
<u>15556</u>	62224
$3 \times 74^3 = 16428$	3294488
$3 \times 740^3 = 1642800$	
$3 \times 740 \times 2 = 4440$	
$2^3 = 4$	
<u>1647244</u>	3294488
	000

(7) $\sqrt[3]{27} = 3$ $\sqrt[3]{64} = 4$ $\therefore \sqrt[3]{81} = 4$

(8) $\sqrt[3]{8} = 2$

$$\begin{array}{r}
 2000000000 \quad (643 \\
 216 \\
 3 \times 6^3 = 108 \quad 50400 \\
 3 \times 60^3 = 10800 \\
 3 \times 60 \times 4 = 720 \\
 4^3 = 16 \\
 \hline
 11536 \quad 46144 \\
 3 \times 64^3 = 12288 \quad 4522666 \\
 3 \times 640^3 = 1228800 \\
 3 \times 64 \times 8 = 5760 \\
 8^3 = 9 \\
 \hline
 1234569 \quad 8 \quad 3707
 \end{array}$$

(9) $\sqrt[3]{34} = 3.8$

$$\begin{array}{r}
 3.800000000 \quad (1.560 \\
 1 \\
 3 \times 1^3 = 3 \quad 2800 \\
 3 \times 10^3 = 300 \\
 3 \times 10 \times 5 = 150 \\
 5^3 = 25 \\
 \hline
 475 \quad 2875 \\
 3 \times 15^3 = 675 \quad 425000 \\
 3 \times 150^3 = 67500 \\
 3 \times 150 \times 6 = 2700 \\
 6^3 = 36 \\
 \hline
 70236 \quad 421416 \\
 3 \times 156^3 = 73008 \quad 3584000 \\
 3 \times 1560^3 = 7300800 \\
 3 \times 1560 \times 0 = 0 \\
 0^3 = 0 \\
 \hline
 7300800
 \end{array}$$

(10) $\sqrt[3]{1} = 1$

(11)

$$\begin{array}{r}
 100000000 \text{ (404)} \\
 84 \\
 \hline
 3 \times 4^2 = 48 \quad 38000 \\
 3 \times 40^2 = 4800 \\
 3 \times 40 \times 6 = 720 \\
 6^2 = 36 \\
 \hline
 5556 \quad 33336 \\
 3 \times 46^2 = 6348 \quad 2664000 \\
 3 \times 460^2 = 634800 \\
 3 \times 460 \times 4 = 5520 \\
 4^2 = 16 \\
 \hline
 640836 \quad 2561344
 \end{array}$$

(12)

$$\begin{array}{r}
 010000000 \text{ (215)} \\
 8 \\
 \hline
 3 \times 2^2 = 12 \quad 2000 \\
 3 \times 20^2 = 1200 \\
 3 \times 20 \times 1 = 60 \\
 1^2 = 1 \\
 \hline
 1261 \quad 1261 \\
 3 \times 21^2 = 1323 \quad 739000 \\
 3 \times 210^2 = 132300 \\
 3 \times 210 \times 5 = 3150 \\
 5^2 = 25 \\
 \hline
 135475 \quad 677375
 \end{array}$$

(13)

000000000 (2154

8

$$\begin{array}{r}
 3 \times 2^2 = 12 \\
 3 \times 20^2 = 1200 \\
 3 \times 20 \times 1 = 60 \\
 1^2 = 1 \\
 \hline
 1261 \quad 1261 \\
 3 \times 21^2 = 1323 \\
 3 \times 210^2 = 132300 \\
 3 \times 210 \times 5 = 3150 \\
 5^2 = 25 \\
 \hline
 135475 \quad 677375 \\
 3 \times 215^2 = 138675 \\
 3 \times 2150^2 = 13867500 \\
 3 \times 2150 \times 4 = 25800 \\
 4^2 = 16 \\
 \hline
 18898316 \quad 55573264
 \end{array}$$

(14)

037373737 (333

27

$$\begin{array}{r}
 3 \times 3^2 = 27 \\
 3 \times 30^2 = 2700 \\
 3 \times 30 \times 3 = 270 \\
 3^2 = 9 \\
 \hline
 2979 \quad 8937 \\
 3 \times 33^2 = 3267 \\
 3 \times 330^2 = 326700 \\
 3 \times 330 \times 3 = 2970 \\
 3^2 = 9 \\
 \hline
 329679 \quad 989037
 \end{array}$$

Ex. L³ (p. 152.)

PAPER 2.

(1)	oz.	(2)	
16	4) 558553	144 : 175 :: 12 oz. : popor- tion of a lb. Avoirdupoise.	
	4) 138388—1 4 × 0 + [1 = 1 oz.		$\frac{175 \times 12}{144} = 14\frac{7}{12}$.
28	4) 84597—0	∴ 1 cz. Avoir. : 1 oz. Troy ∴ $14\frac{7}{12}$: 16 or as 175 : 192. ∴ 1 oz. Avoir. is $\frac{175}{192}$ of 1 oz. Troy.	
	7) 8649—1 4 × 4 + [1 = 17 lbs.		
	4) 1235—4		
	20) 308—3 qrs.		
	15 tons, 8 cwt.		
	15 Tons, 8 cwt., 3 qrs.,		
	17 lbs., 1 oz.		

(3)	£	fl.	c.	m.	
	2.	0.	7.	0.	= value of 1 cwt.
				16	
2 qrs. = $\frac{1}{4}$ of 1 cwt.	32	11	2	0	= value of 16 cwt.
1 qr. = $\frac{1}{8}$ of 2 qrs.	1	0	3	5	= value of 2 qrs.
14 lbs. = $\frac{1}{8}$ of 1 qr.		5	1	7.5	= value of 1 qr.
2 lbs. = $\frac{1}{4}$ of 14 lbs.		2	5	8.75	= value of 14 lbs.
			3	6.96428571	= val. of 2 lbs.
	£34.	9.	6.	8.21428571	= value of [16 cwt., 3 qrs., 14 lbs.]

$$(4) \text{ (1) } 20803) 67273 \text{ (3)} \\ \underline{62406}$$

$$4864) 20803 \text{ (4)} \\ \underline{19456}$$

$$1347) 4864 \text{ (3)} \\ \underline{4041}$$

$$823) 1347 \text{ (1)} \\ \underline{823}$$

$$\text{(2)} \\ 2) 8, 9, 10, 12, 15, 18, 35, 84 \\ \underline{2) 4, 5, 15, 9, 35, 42} \\ 524) 823 \text{ (1)} \\ \underline{524}$$

$$3) 2, 15, 9, 35, 21 \\ \underline{299) 524 \text{ (1)}} \\ \underline{299}$$

$$\begin{array}{r} 2, 5, 8, 35, 7 \\ \therefore \text{L. C. M.} = 2 \times 2 \times 3 \times 2 \times 3 \times 35 = 2520. \end{array} \begin{array}{r} 225) 299 \text{ (1)} \\ \underline{74) 225 \text{ (3)}} \\ 222 \\ \underline{74} \end{array}$$

$$3) 74 \text{ (24)} \\ \underline{72}$$

$$2) 3 \text{ (1)} \\ \underline{2}$$

$$\underline{1}$$

$\therefore 1$ is the G. C. M.

$$(5) \text{ (1) } \frac{1}{8} \text{ of } \frac{5}{11} \text{ of } 99\frac{1}{2} = \frac{1}{8} \text{ of } \frac{5}{11} \text{ of } 198\frac{1}{2} = 17 \\ \frac{1}{4} \text{ of } \frac{3}{8} \text{ of } 69\frac{3}{10} = \frac{1}{4} \text{ of } \frac{3}{8} \text{ of } 138\frac{3}{10} = 11 \\ \frac{1}{7} \text{ of } \frac{1}{2} \text{ of } 306\frac{1}{2} = \frac{1}{7} \text{ of } \frac{1}{2} \text{ of } 613 = 35 \\ 17 + 11 + 35 = 63.$$

$$\text{(2) } 13s. 1\frac{1}{2}d. = 315 \text{ half pence} \\ \frac{1}{2} \text{ of } 1\frac{1}{2} \text{ of a guinea} = \frac{1}{2} \text{ of } \frac{3}{2} \text{ of } 504 \text{ h'f p.} = 567 \text{ h'f p.} \\ \therefore \text{Fraction required is } \frac{315}{567} = \frac{5}{9}.$$

(Continued on next page.)

(5 continued.)

$$(\gamma) \frac{1}{112} \text{ of a ton} = \frac{107 \times 20}{448} \text{ cwt.} = 4\frac{87}{112} \text{ cwt.}$$

$$4\frac{87}{112} \text{ of a cwt.} = \frac{87 \times 4}{112} \text{ qrs.} = 3\frac{3}{8} \text{ qrs.}$$

$$- \frac{3}{8} \text{ of a qr.} = \frac{3 \times 28}{28} \text{ lbs.} = 3 \text{ lbs.}$$

4 cwt., 3 qrs., 3 lbs.

$$(6) \cdot 37) 7792 \cdot 20 \text{ (21060}$$

74

39

37

222

222

0

$$7792 \cdot 2 = 7792\frac{1}{2}$$

$$\cdot 37 = \frac{37}{100}$$

$$7792\frac{1}{2} \div \frac{37}{100} = 21061 \times \frac{100}{37} = 21060.$$

$$370) \cdot 0077922 \text{ (00002106}$$

74

39

37

222

222

$$\cdot 007792 = \frac{7792}{1000000}$$

$$\frac{7792}{1000000} \times \frac{100}{37} = \frac{2106}{1000000} = \cdot 00002106.$$

PAPER II.

$$(1) (1) \$7300$$

34

\$21900

5475

\$273.75

365 : 120 :: \$273.75 :
interest required.

$$\therefore \text{Int. reqd} = \$ \frac{273.75 \times 120}{365}$$

\$90

$$(\gamma) \text{ Int. on } £100 \text{ for } 2\frac{1}{2} \text{ yrs.}$$

at $3\frac{1}{2}$ per cent. = £9 12s. 6d.

£109 12s. 6d. : £3204 14s. 1d.

:: £9 12s. 6d. : disc't reqd

 $\therefore \text{Disc't} = \frac{769129 \times 2310}{26310} \text{ d.}$

= 67529d. = £281 7s. 5d.

$$(2) \$3320 - \$3656 = \$664.$$

$$\$3656 : \$100 :: \$664 : \text{required gain per cent.}$$

$$\therefore \text{Required gain} = \$ \frac{664 \times 100}{2656} = \$25.$$

$$\$3320 : \$100 :: \$664 : \text{loss per cent.}$$

$$\therefore \text{Loss per cent.} = \$ \frac{664 \times 100}{3320} = \$20.$$

$$(3) (1) \quad \begin{array}{r} 930372004 \\ 9 \end{array} \quad (30502)$$

$$\begin{array}{r} 605 \overline{) 3037} \\ \underline{3025} \\ 12004 \\ 61002 \overline{) 122004} \\ \underline{122004} \end{array}$$

$$(2) \quad \begin{array}{r} 16777216 \\ 8 \end{array} \quad (256)$$

$$\begin{array}{r} 3 \times 2^3 = 12 \quad 8777 \\ 3 \times 20^2 = 1200 \\ 3 \times 20 \times 5 = 300 \\ 5^2 = 25 \\ \hline 1525 \quad 7625 \\ 3 \times 25^2 = 1875 \quad 1152316 \\ 3 \times 250^2 = 187500 \\ 3 \times 250 \times 6 = 4500 \\ 6^2 = 36 \\ \hline 192086 \quad 1152216 \end{array}$$

(3) Surface of square = 2533 sq. ft., 64 sq. in. or 364816 sq. inches; $\therefore$ side of square = $\sqrt{364816}$ sq. in. = 604 in. = 16 yds., 2 ft., 4 in.; $\therefore$ perimeter of square = 16 yds., 2 ft., 4 in. $\times 4$ = 67 yds., 4 in.

$$(4) \quad \begin{array}{r} 365 \\ 5 \\ \hline 1825 \end{array}$$

$$\begin{array}{r} 365 \\ 20 \\ \hline 7300 \end{array}$$

$$\begin{array}{r} 365 \\ 300 \\ \hline 109500 \end{array}$$

$$\begin{array}{r} 109500 \\ 7300 \\ 1825 \\ \hline 118625 \end{array}$$

$$(5) \quad \begin{array}{r} 2) 22932 \\ \hline \end{array}$$

$$\begin{array}{r} 2) 11466 \\ \hline \end{array}$$

$$\begin{array}{r} 3) 5733 \\ \hline \end{array}$$

$$\begin{array}{r} 3) 1911 \\ \hline \end{array}$$

$$\begin{array}{r} 7) 637 \\ \hline \end{array}$$

$$2 \times 2 \times 3 \times 3 \times 7 \times 7 \times 13.$$

$$\begin{array}{r} 7) 637 \\ \hline \end{array}$$

$$\begin{array}{r} 7) 91 \\ \hline \end{array}$$

$$13$$

(6) If he travels $22\frac{1}{2}$ miles per hour, he will travel 20 miles in $\frac{20}{22\frac{1}{2}}$ of an hour, or $\frac{2}{3}\frac{1}{2}$ hours.

He then travels the remaining 32 miles at the rate of ($\frac{1}{2}$ of $22\frac{1}{2}$) miles per hour = $3\frac{1}{2}$ miles per hour.

$\therefore$ To travel 32 miles he would require $(32 \div 3\frac{1}{2})$ hrs. = $8\frac{1}{2}$ hrs. which added to the above $\frac{2}{3}\frac{1}{2}$ hr. = $9\frac{1}{3}$ hrs. or 9 hrs., $34' 27\frac{3}{4}''$.

If he start at 9 A. M. and travel for 9 hrs. $34' 27\frac{3}{4}''$ he will arrive at his journey's end at 6 h. $34' 27\frac{3}{4}''$ P. M.

PAPER III.

(1) If A fire twice in 3 minutes, he requires $1\frac{1}{2}$ minutes to fire once; $\therefore$ to fire 55 cartridges he requires $(55 \times 1\frac{1}{2})$ minutes = $82\frac{1}{2}$ minutes.

Similarly B will require $(55 \times 1\frac{1}{2})$ minutes = $91\frac{1}{2}$ minutes; $\therefore B$ will be firing $(91\frac{1}{2} - 82\frac{1}{2})$ minutes after A has ceased = $9\frac{1}{2}$ minutes: and as he requires $1\frac{1}{2}$ minutes to fire once, he will fire $(9\frac{1}{2} \div 1\frac{1}{2})$ times = $5\frac{1}{2}$ times.

$$(2) \quad (1) \quad \frac{17}{20 \times 8} = \frac{17}{160}$$

$$160) 17 \cdot 0 \text{ (10625 } 160$$

$$\begin{array}{r} 1000 \\ \hline \end{array}$$

$$\begin{array}{r} 960 \\ \hline \end{array}$$

$$\begin{array}{r} 400 \\ \hline \end{array}$$

$$\begin{array}{r} 320 \\ \hline \end{array}$$

$$\begin{array}{r} 800 \\ \hline \end{array}$$

$$\begin{array}{r} 800 \\ \hline \end{array}$$

$$(2) \quad 3s. 0\frac{1}{2}d. = 73 \text{ half pence}$$

$$£5 = 2400 \text{ half pence}$$

$$\therefore \text{Fraction} = \frac{73}{2400} \text{ and dec.} = \frac{73 \cdot 00}{2400} \text{ (030416 } 7200$$

$$\begin{array}{r} 7200 \\ \hline \end{array}$$

$$\begin{array}{r} 10000 \\ \hline \end{array}$$

$$\begin{array}{r} 9600 \\ \hline \end{array}$$

$$\begin{array}{r} 4000 \\ \hline \end{array}$$

$$\begin{array}{r} 2400 \\ \hline \end{array}$$

$$\begin{array}{r} 16000 \\ \hline \end{array}$$

$$\begin{array}{r} 14400 \\ \hline \end{array}$$

$$\begin{array}{r} 1600 \\ \hline \end{array}$$

$$\begin{array}{r} 16000 \\ \hline \end{array}$$

(Continued on next page.)

(2 Continued.)

(2) $\cdot 36$ of a guinea = $\frac{36}{100} = \frac{9}{25}$ of a guinea.

25) 9

21

189 (7s. $6\frac{1}{2}$ d.)

175

14

12

168

150

 $\frac{1}{2}$ $\therefore \cdot 36$ of a guinea = 7s. $6\frac{1}{2}$ d.and $\cdot 36$ of a £ = 7s. $3\frac{3}{4}$ d. $\therefore \cdot 36$ of a guinea is the greater.(4) 7s. $6\frac{1}{2}$ d. - 7s. $3\frac{3}{4}$ d. = $3\frac{1}{4}$ d.

(3) Int. of \$100 for 15 mo's at 5 per cent. = \$6.25.]

\$106.25 : \$552.50 :: \$100 : required sum.

 $\therefore$ Sum required = $\$ \frac{100 \times 552.50}{106.25} = \$520.$ (4) Number of sq. ft. on the walls = $143 \times 3 \times 2 = 858$ This is obtained from $(2 \text{ length} + 2 \text{ breadth}) \times 11.$ $\therefore (2 \text{ length} \times 2 \text{ breadth}) \times 11 = 858.$ or $2 \text{ length} + 2 \text{ breadth} = 78$; but $\text{length} = 2 \text{ breadth}.$ $\therefore 3 \text{ breadth} = 39. \therefore \text{breadth} = 13 \text{ ft. and length} = 26 \text{ ft.}$ No. of sq. ft. in floor = $26 \times 13 = 338$, or 37 sq. yds.

5 sq. ft.

(5) From 9 A. M. on Tuesday till 11 A. M. on Wednesday there are 26 hours, during which time the slow clock loses 10 minutes.

Also from 11 A. M. till 9 P. M. on Wednesday there are 10 hours.

26 hours : 10 hours :: 10 minutes : No. of minutes

which the slow clock loses in 10 hours = $\frac{10 \times 10}{26} \text{ min.} =$ 3 minutes, $50\frac{1}{3}$ seconds. $\therefore$ The clock must be put on 10 minutes + 3 minutes, $50\frac{1}{3}$ seconds = 13 minutes, $50\frac{1}{3}$ seconds.

(6) 43 shares at £11 $\frac{1}{4}$ = £494 $\frac{1}{4}$.

∴ 128 : 494 $\frac{1}{4}$:: 100 stock : stock required.

$$\therefore \text{Stock required} = \frac{494\frac{1}{4} \times 100}{128} = 386\frac{3}{4}.$$

Annual income therefrom at 6 per cent = £23 3s. 7 $\frac{1}{2}$ d.

PAPER IV.

$$(1) \quad (1) \quad \frac{1}{2} + \frac{2}{3} + \frac{1}{3} + \frac{5}{21} = \frac{21}{42} + \frac{28}{42} + \frac{14}{42} + \frac{10}{42} = \frac{73}{42} = 1\frac{31}{42}.$$

$$1\frac{3}{4} \text{ of } \frac{4}{27} = \frac{5}{9} \times \frac{4}{27} = \frac{5}{9} \times \frac{36}{25} = \frac{12}{5}. \quad \therefore \text{Fraction required is}$$

$$\frac{1\frac{3}{4}}{1\frac{2}{3}} = \frac{\frac{7}{2}}{\frac{2}{3}} = \frac{17}{5} \times \frac{5}{12} = \frac{17}{12}.$$

$$(2) \quad .027) 3.330 \quad (123\frac{1}{3}$$

27

63

54

90

81

— ∴ .027 can be taken 123 times from
 $\frac{3}{27} = \frac{1}{9}$ 3.33 and the fraction remaining is $\frac{1}{9}$.

(2) Each person received £3 3s. 4 $\frac{1}{2}$ d. ∴ The 43 persons received £3 3s. 4 $\frac{1}{2}$ d. × 43 = £136 5s. 1 $\frac{1}{2}$ d.

Then (£1 - 6d.) : £1 :: £136 5s. 1 $\frac{1}{2}$ d. : original am't.

Or 19s. 6d. : £1 :: £136 5s. 1 $\frac{1}{2}$ d. : original am't

$$\therefore \text{Original amount} = \frac{65403 \times 40}{39} \text{ half pence} = 67080$$

half pence = £139 15s.

$$(3) \quad (1) \quad 13 \text{ cwt. } 2 \text{ qrs. } 19 \text{ lbs. : } 41 \text{ cwt., } 1 \text{ lb. } \left. \begin{array}{l} 35 : 49 \end{array} \right\} \therefore £4 \text{ } 17\text{s.}$$

6d. : required amount.

$$\text{Or } 1531 \text{ lbs. : } 4593 \text{ lbs. } \left. \begin{array}{l} 35 : 49 \end{array} \right\} \therefore 1170\text{d. : required amount}$$

in pence.

$$\therefore \text{Am't} = \frac{1170 \times 4593 \times 49}{1531 \times 35} \text{d.} = 4914\text{d.} = £20 \text{ } 9\text{s. } 6\text{d.}$$

(2) The bankrupt owes D \$2085—(\$235 + \$325 + \$525)
 = \$2085—\$1085 = \$1000.

\$1000 : \$1 :: \$525 : required payment in the \$.

∴ Payment in the \$ = $\$ \frac{525 \times 1}{1000} = 52\frac{1}{2}$ cts.

(4) £112½ : 45s. ∴ £100 : original cost per dozen.

∴ Original cost per doz. = $\frac{2000 \times 45}{2250}$ s. = 40s.

Since there are 52 dozen in a butt, the average cost for a butt will be (40×52) s. = £104; and for three butts the cost will be $\pounds(104 \times 3) = \pounds312$. But the first and second butts together cost $\pounds(120 + 110) = \pounds230$. ∴ The third butt costs $\pounds310 - \pounds230 = \pounds82$.

(5) 2 Turkeys and 9 fowls cost £2 18s. 6d.

∴ 10 turkeys and 45 fowls cost £14 12s. 6d.; also 5 turkeys and 2 fowls cost £4 8s. 2d..

∴ 10 turkeys and 4 fowls cost £8 16s. 4d.

But 10 turkeys and 45 fowls cost £14 12s. 6d.

∴ 41 fowls cost £5 16s. 2d., and one fowl costs 2s. 10d.

And if 2 turkeys and 9 fowls cost £2 18s. 6d., 2 turkeys will cost £2 18s. 6d. — $(9 \times 2$ s. 10d.) = £2 18s. 6d. — £1 5s. 6d. = £1 13s. ∴ 1 Turkey will cost £1 13s. ÷ 2 = 16s. 6d.

(6) Area of field = 13 ac., 81 yds. = 63001 sq. yds.

∴ One side of field = $\sqrt{63001}$ yds. = 251 yds. ∴ Perimeter of field = 251 yds. $\times 4 = 1004$ yds.

3½ mls. : 1004 yds. ∴ 60 min. : required time.

∴ Required time = $\frac{60 \times 1004}{5866\frac{2}{3}}$ min. = $\frac{60 \times 3012}{17600}$ min. =

10 min. 16½ sec.,